SUBCHAPTER D : STANDARDS FOR PROTECTION AGAINST RADIATION
§§336.301-336.368
Effective June 5,1997

§336.301. Purpose and Scope.

(a) This subchapter establishes standards for protection against ionizing radiation resulting from activities conducted under licenses issued by the commission.

(b) The rules in this subchapter are designed to control the receipt, possession, use, transfer, and disposal of licensed radioactive material by any commission licensee so that the total dose to an individual, including doses resulting from licensed and unlicensed radioactive material and from radiation sources other than background radiation, does not exceed the standards for protection against radiation prescribed in this subchapter. However, nothing in this subchapter shall be construed as limiting actions that may be necessary to protect health and safety.

(c) Except as specifically provided in other parts of this chapter, this subchapter applies to persons licensed by the commission to receive, possess, use, transfer, or dispose of radioactive material. The limits in this subchapter do not apply to doses due to background radiation, to exposure of patients to radiation for the purpose of medical diagnosis or therapy, or to voluntary participation in medical research programs.

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§336.302. Definitions.

Terms used in this subchapter are defined in §336.2 of this title (relating to Definitions). Additional terms used in this subchapter and in §336.363, Appendix F, of this title (relating to Requirements for Receipt of Low-Level Radioactive Waste for Disposal at Licensed Land Disposal Facilities and Manifests) are given in that section.

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§336.303. Implementation.

(a) The applicable section of this subchapter must be used in lieu of requirements in the standards for protection against radiation in effect before January 1, 1994, that are cited in license conditions, except as specified in subsections (b), (c), and (d) of this section. If the requirements of this subchapter are more restrictive than the existing license condition, then the licensee shall comply with this subchapter unless exempted by subsection (c) of this section.

(b) Any existing license condition that is more restrictive than a requirement in this subchapter remains in force until there is an amendment or renewal of the license.

(c) If a license condition exempted a licensee from a requirement in the standards for protection against radiation in effect before January 1, 1994, it also exempts the licensee from the corresponding provision of this subchapter.

(d) If a license condition cites provisions in requirements in the standards for protection against radiation in effect before January 1, 1994, and there are no corresponding provisions in this subchapter, the license condition remains in force until there is an amendment or renewal of the license that modifies or removes this condition.

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§336.304. Radiation Protection Programs.

(a) Each licensee shall develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions of this subchapter. See §336.342 of this title (relating to Records of Radiation Protection Programs) for requirements for maintaining records relating to these programs.

(b) The licensee shall use, to the extent practicable, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA).

(c) The licensee shall, at intervals not to exceed 12 months, review the radiation protection program content and implementation.

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§336.305. Occupational Dose Limits for Adults.

(a) The licensee shall control the occupational dose to individual adults, except for planned special exposures under §336.310 of this title (relating to Planned Special Exposures), to the following dose limits:

(1) an annual limit, which is the more limiting of:

(A) the total effective dose equivalent being equal to 5 rems (0.05 sievert); or

(B) the sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 50 rems (0.5 sievert).

(2) the annual limits to the lens of the eye, to the skin, and to the extremities which are:

(A) an eye dose equivalent of 15 rems (0.15 sievert), and

(B) a shallow-dose equivalent of 50 rems (0.5 sievert) to the skin or to any extremity.

(b) Doses received in excess of the annual limits, including doses received during accidents, emergencies, and planned special exposures, shall be subtracted from the limits for planned special exposures that the individual may receive during the current year and during the individual's lifetime. See §336.310(5)(A) and (B) of this title (relating to Planned Special Exposures).

(c) The assigned deep-dose equivalent and shallow-dose equivalent shall be for the part of the body receiving the highest exposure. The deep-dose equivalent, eye dose equivalent, and shallow-dose equivalent may be assessed from surveys or other radiation measurements for the purpose of demonstrating compliance with the occupational dose limits, if the individual monitoring device was not in the region of highest potential exposure or the results of individual monitoring are unavailable.

(d) Derived air concentration (DAC) and annual limit on intake (ALI) values are specified in Table I of §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage) and may be used to determine the individual's dose and to demonstrate compliance with the occupational dose limits. See §336.346 of this title (relating to Records of Individual Monitoring Results).

(e) In addition to the annual dose limits, the licensee shall limit the soluble uranium intake by an individual to 10 milligrams in a week in consideration of chemical toxicity. See note 3 of §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage).

(f) The licensee shall reduce the dose that an individual may be allowed to receive in the current year by the amount of occupational dose received while employed by any other person. See §336.309(e) of this title (relating to Determination of Prior Occupational Dose).

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§336.306. Compliance with Requirements for Summation of External and Internal Doses.

(a) If the licensee is required to monitor under both §336.316(1) and (2) of this title (relating to Conditions Requiring Individual Monitoring of External and Internal Occupational Dose), the licensee shall demonstrate compliance with the dose limits by summing external and internal doses. If the licensee is required to monitor only under §336.316(1) of this title or only under §336.316(2) of this title, then summation is not required to demonstrate compliance with the dose limits. The licensee may demonstrate compliance with the requirements for summation of external and internal doses by meeting the conditions specified in subsections (b), (c), and (d) of this section. (The dose equivalents for the lens of the eye, the skin, and the extremities are not included in the summation but are subject to separate limits.)

(b) If the only intake of radionuclides is by inhalation, the total effective dose equivalent limit is not exceeded if the sum of the deep-dose equivalent divided by the total effective dose equivalent limit and one of the following does not exceed 1:

(1) the sum of the fractions of the inhalation annual limits on intake (ALI) for each radionuclide; or

(2) the total number of derived air concentration-hours (DAC-hours) for all radionuclides divided by 2,000; or

(3) the sum of the calculated committed effective dose equivalents to all significantly irradiated organs or tissues (T) calculated from bioassay data using appropriate biological models and expressed as a fraction of the annual limit. For purposes of this requirement, an organ or tissue is deemed to be significantly irradiated if, for that organ or tissue, the product of the weighting factor (w_T) and the committed dose equivalent ($H_{T,50}$) per unit intake is greater than 10% of the maximum weighted value of $H_{T,50}$ (i.e., $w_T H_{T,50}$) per unit intake for any organ or tissue.

(c) If the occupationally-exposed individual also receives an intake of radionuclides by oral ingestion greater than 10% of the applicable oral ALI, the licensee shall account for this intake and include it in demonstrating compliance with the limits.

(d) The licensee shall evaluate and, to the extent practical, account for intakes through wounds or skin absorption. (The intake through intact skin has been included in the calculation of DAC for hydrogen-3 and does not need to be further evaluated under this subsection.)

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§336.307. Determination of External Dose from Airborne Radioactive Material.

(a) Licensees shall, when determining the dose from airborne radioactive material, include the contribution to the deep-dose equivalent, eye dose equivalent, and shallow-dose equivalent from external exposure to the radioactive cloud. See notes 1 and 2 of §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage).

(b) Airborne radioactivity measurements and DAC values shall not be used as the primary means to assess the deep-dose equivalent when the airborne radioactive material includes radionuclides other than noble gases or if the cloud of airborne radioactive material is not relatively uniform. The determination of the deep-dose equivalent to an individual shall be based upon measurements using instruments or individual monitoring devices.

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§336.308. Determination of Internal Exposure.

(a) For purposes of assessing dose used to determine compliance with occupational dose equivalent limits, the licensee shall, when required under §336.316 of this title (relating to Conditions Requiring Individual Monitoring of External and Internal Occupational Dose), take suitable and timely measurements of:

(1) concentrations of radioactive materials in air in work areas; or

(2) quantities of radionuclides in the body; or

(3) quantities of radionuclides excreted from the body; or

(4) combinations of these measurements.

(b) Unless respiratory protection equipment is used, as provided in §336.321 of this title (relating to Use of Individual Respiratory Protection Equipment), or the assessment of intake is based on bioassays, the licensee shall assume that an individual inhales radioactive material at the airborne concentration in which the individual is present.

(c) When specific information on the physical and biochemical properties of the radionuclides taken into the body or the behavior of the material in an individual is known, the licensee may:

(1) use that information to calculate the committed effective dose equivalent and shall document that information, if used, in the individual's record; and

(2) upon prior approval in the license by the commission, adjust the DAC or ALI values to reflect the actual physical and chemical characteristics of airborne radioactive material (e.g., aerosol size distribution or density); and

(3) separately assess the contribution of fractional intakes of Class D, W, or Y compounds of a given radionuclide to the committed effective dose equivalent. See §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage).

(d) If the licensee chooses to assess intakes of Class Y material using the measurements given in subsection (a)(2) or (3) of this section, the licensee may delay the recording and reporting of the assessments for periods up to 7 months, unless otherwise required by §336.351 of this title (relating to Notification of Incidents) or §336.352 of this title (relating to Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Limits). This delay permits the licensee to make additional measurements basic to the assessments.

(e) If the identity and concentration of each radionuclide in a mixture are known, the fraction of the DAC applicable to the mixture for use in calculating DAC-hours shall be either:

(1) the sum of the ratios of the concentration to the appropriate DAC value (e.g., D, W, or Y) from §336.359, Appendix B, of this title for each radionuclide in the mixture; or

(2) the ratio of the total concentration for all radionuclides in the mixture to the most restrictive DAC value for any radionuclide in the mixture.

(f) If the identity of each radionuclide in a mixture is known, but the concentration of one or more of the radionuclides in the mixture is not known, the DAC for the mixture shall be the most restrictive DAC of any radionuclide in the mixture.

(g) When a mixture of radionuclides in air exists, a licensee may disregard certain radionuclides in the mixture if:

(1) The licensee uses the total activity of the mixture in demonstrating compliance with the dose limits in §336.305 of this title (relating to Occupational Dose Limits for Adults) and in complying with the monitoring requirements in §336.316(2) of this title; and

(2) The concentration of any radionuclide disregarded is less than 10% of its DAC; and

(3) The sum of these percentages for all of the radionuclides disregarded in the mixture does not exceed 30%.

(h) When determining the committed effective dose equivalent, the following information may be considered:

(1) To calculate the committed effective dose equivalent, the licensee may assume that the inhalation of one ALI, or an exposure of 2,000 DAC-hours, results in a committed effective dose equivalent of 5 rems (0.05 sievert) for radionuclides that have their ALIs or DACs based on the committed effective dose equivalent.

(2) When the ALI (and the associated DAC) is determined by the nonstochastic organ dose limit of 50 rems (0.5 sievert), the intake of radionuclides that would result in a committed effective dose equivalent of 5 rems (0.05 sievert) (the stochastic ALI) is listed in parentheses in Table I of §336.359, Appendix B, of this title. In this case, the licensee may, as a simplifying assumption, use the stochastic ALI to determine committed effective dose equivalent. However, if the licensee uses the stochastic ALI, the licensee shall also demonstrate that the limit in §336.305(a)(1)(B) of this title is met.

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§336.309. Determination of Prior Occupational Dose.

(a) For each individual who is likely to receive in a year an occupational dose requiring monitoring under §336.316 of this title (relating to Conditions Requiring Individual Monitoring of External and Internal Occupational Dose), the licensee shall:

(1) determine the occupational radiation dose received during the current year; and

(2) attempt to obtain the records of lifetime cumulative occupational radiation dose.

(b) Before permitting an individual to participate in a planned special exposure, the licensee shall determine:

(1) the internal and external doses from all previous planned special exposures; and

(2) all doses in excess of the limits, including doses received during accidents and emergencies, received during the lifetime of the individual.

(c) In complying with the requirements of subsection (a) of this section, a licensee may:

(1) accept, as a record of the occupational dose that the individual received during the current year, a written signed statement from the individual, or from the individual's most recent employer for work involving radiation exposure, that discloses the nature and the amount of any occupational dose that the individual received during the current year; and

(2) accept, as the record of lifetime cumulative radiation dose, an up-to-date form "Cumulative Occupational Exposure History" (see §336.367, Appendix J of this title (relating to Cumulative Occupational Exposure History)) or equivalent, signed by the individual and countersigned by an appropriate official of the most recent employer for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee; and

(3) obtain reports of the individual's dose equivalent from the most recent employer for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee, by telephone, telegram, electronic media, or letter. The licensee shall request a written verification of the dose data if the authenticity of the transmitted report cannot be established.

(d) The licensee shall record individual exposure histories.

(1) The licensee shall record the exposure history of each individual, as required by subsection (a) of this section, on form "Cumulative Occupational Exposure History" (see §336.367, Appendix J of this title) or other clear and legible record which includes all of the information required on that form. The form or record shall show each period in which the individual received occupational exposure to radiation or radioactive material and shall be signed by the individual who received the exposure. For each period for which the licensee obtains reports, the licensee shall use the dose shown in the report in preparing form "Cumulative Occupational Exposure History" (see §336.367, Appendix J of this title) or equivalent. For any period for which the licensee does not obtain a report, the licensee shall place a notation on form "Cumulative Occupational Exposure History" (see §336.367, Appendix J of this title) or equivalent indicating the periods of time for which data are not available.

(2) Licensees are not required to separate historical dose, obtained and recorded before January 1, 1994, into external dose equivalent(s) and internal committed dose equivalent(s). Further, occupational exposure histories obtained and recorded on form "Cumulative Occupational Exposure History" (see §336.367, Appendix J of this title) or equivalent before January 1, 1994, would not have included effective dose equivalent but may be used in the absence of specific information on the intake of radionuclides by the individual.

(e) If the licensee is unable to obtain a complete record of an individual's current and previously accumulated occupational dose, the licensee shall assume:

(1) in establishing administrative controls under §336.305(f) of this title (relating to Occupational Dose Limits for Adults) for the current year, that the allowable dose limit for the individual is reduced by 1.25 rems (12.5 millisieverts) for each quarter for which records are unavailable and that the individual was engaged in activities that could have resulted in occupational radiation exposure; and

(2) that the individual is not available for planned special exposures.

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§336.310. Planned Special Exposures.

A licensee may authorize an adult worker to receive doses in addition to and accounted for separately from the doses received under the limits specified in §336.305 of this title (relating to Occupational Dose Limits for Adults) provided that each of the following conditions is satisfied:

(1) The licensee authorizes a planned special exposure only in an exceptional situation when alternatives that might avoid the higher exposure are unavailable or impractical.

(2) The licensee, and employer if the employer is not the licensee, specifically authorizes the planned special exposure, in writing, before the exposure occurs.

(3) Before a planned special exposure, the licensee ensures that each individual involved is:

(A) informed of the purpose of the planned operation; and

(B) informed of the estimated doses and associated potential risks and specific radiation levels or other conditions that might be involved in performing the task; and

(C) instructed in the measures to be taken to keep the dose as low as is reasonably achievable considering other risks that may be present.

(4) Before permitting an individual to participate in a planned special exposure, the licensee ascertains prior doses as required by §336.309(b) of this title (relating to Determination of Prior Occupational Dose) during the lifetime of the individual for each individual involved.

(5) Subject to §336.305(b) of this title, the licensee shall not authorize a planned special exposure that would cause an individual to receive a dose from all planned special exposures and all doses in excess of the limits to exceed:

(A) the numerical values of any of the dose limits in §336.305(a) of this title in any year; and

(B) five times the annual dose limits in §336.305(a) of this title during the individual's lifetime.

(6) The licensee maintains records of the conduct of a planned special exposure in accordance with §336.345 of this title (relating to Records of Planned Special Exposures) and submits a written report to the executive director in accordance with §336.353 of this title (relating to Reports of Planned Special Exposures).

(7) The licensee records the best estimate of the dose resulting from the planned special exposure in the individual's record and informs the individual, in writing, of the dose within 30 days from the date of the planned special exposure. The dose from planned special exposures shall not be considered in

controlling future occupational dose of the individual under §336.305(a) of this title but shall be included in evaluations required by paragraphs (4) and (5) of this section.

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§336.311. Occupational Dose Limits for Minors.

The annual occupational dose limits for minors are 10% of the annual occupational dose limits specified for adult workers in §336.305 of this title (relating to Occupational Dose Limits for Adults).

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§336.312. Dose to an Embryo/Fetus.

(a) The licensee shall ensure that the dose to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (5 millisieverts). See §336.346 of this title (relating to Records of Individual Monitoring Results) for recordkeeping requirements.

(b) The licensee shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in subsection (a) of this section. (The National Council on Radiation Protection and Measurements recommended in NCRP Report No. 91, "Recommendations on Limits for Exposure to Ionizing Radiation" (June 1, 1987), that no more than 0.05 rem (0.5 millisievert) to the embryo/fetus be received in any one month.)

(c) The dose to an embryo/fetus shall be taken as the sum of:

(1) the deep-dose equivalent to the declared pregnant woman; and

(2) the dose to the embryo/fetus from radionuclides in the embryo/fetus and radionuclides in the declared pregnant woman.

(d) If by the time the woman declares pregnancy to the licensee the dose to the embryo/fetus has exceeded 0.5 rem (5 millisieverts) or is within 0.05 rem (0.5 millisievert) of this dose, the licensee shall be deemed to be in compliance with subsection (a) of this section if the additional dose to the embryo/fetus does not exceed 0.05 rem (0.5 millisievert) during the remainder of the pregnancy.

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§336.313. Dose Limits for Individual Members of the Public.

(a) Each licensee shall conduct operations so that:

(1) The total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (1 millisievert) in a year, exclusive of the dose contribution from the licensee's disposal of radioactive material into sanitary sewerage in accordance with §336.333 of this title (relating to Disposal by Release into Sanitary Sewerage); and

(2) The dose in any unrestricted area from external sources does not exceed 0.002 rem (0.02 millisievert) in any 1 hour.

(b) If the licensee permits members of the public to have access to restricted areas, the limits for members of the public continue to apply to those individuals.

(c) A licensee or an applicant for a license may apply for prior commission authorization to operate up to an annual dose limit for an individual member of the public of 0.5 rem (5 millisieverts). The licensee or applicant shall include the following information in this application:

(1) demonstration of the need for and the expected duration of operations in excess of the limit in subsection (a) of this section;

(2) the licensee's or applicant's program to assess and control dose within the 0.5 rem (5 millisieverts) annual limit; and

(3) the procedures to be followed to maintain the dose as low as is reasonably achievable.

(d) In addition to the requirements of this chapter, a licensee may also be subject to the provisions of the United States Environmental Protection Agency's generally applicable environmental radiation standards in 40 CFR Part 190 (relating to Environmental Radiation Protection Standards for Nuclear Power Operations).

(e) The commission may impose additional restrictions on radiation levels in unrestricted areas and on the total quantity of radionuclides that a licensee may release in effluents in order to restrict the collective dose.

Adopted May 14, 1997 Effective June 5, 1997

§336.314. Compliance with Dose Limits for Individual Members of the Public.

(a) The licensee shall make or cause to be made, as appropriate, surveys of radiation levels in unrestricted areas and radioactive materials in effluents released to unrestricted areas to demonstrate compliance with the dose limits for individual members of the public in §336.313 of this title (relating to Dose Limits for Individual Members of the Public).

(b) A licensee shall show compliance with the annual dose limit in §336.313 of this title by:

(1) demonstrating by measurement or calculation that the total effective dose equivalent to the individual likely to receive the highest dose from the licensed operation does not exceed the annual dose limit; or

(2) demonstrating that:

(A) the annual average concentrations of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the values specified in Table II of

§336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage); and

(B) if an individual were continually present in an unrestricted area, the dose from external sources would not exceed 0.002 rem (0.02 millisievert) in an hour and 0.05 rem (0.5 millisievert) in a year.

(c) Upon approval in the license by the commission, the licensee may adjust the effluent concentration values in §336.359, Appendix B, Table II, of this title for members of the public, to take into account the actual physical and chemical characteristics of the effluents (e.g., aerosol size distribution, solubility, density, radioactive decay equilibrium, and chemical form).

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§336.315. General Requirements for Surveys and Monitoring.

(a) Each licensee shall make, or cause to be made, surveys that:

(1) are necessary for the licensee to comply with the rules in this chapter or conditions of the license; and

(2) are reasonable under the circumstances to evaluate:

(A) radiation levels;

(B) concentrations or quantities of radioactive material; and

(C) the potential radiological hazards that could be present.

(b) The licensee shall ensure that instruments and equipment used for quantitative radiation measurements (e.g., dose rate and effluent monitoring) are calibrated:

(1) by a person licensed by the Texas Department of Health, another Agreement State, a Licensing State, or the United States Nuclear Regulatory Commission to perform this service;

(2) at intervals not to exceed 12 months, unless a more restrictive time interval is specified in another part of this chapter or in the license; and

(3) for the types of radiation measured and at appropriate energies.

(c) All personnel dosimeters, except for direct and indirect reading pocket ionization chambers and those dosimeters used to measure the dose to any extremity, that require processing to determine the radiation dose and that are used by licensees to comply with §336.305 of this title (relating to Occupational Dose Limits for Adults), with other applicable provisions of this chapter, or with conditions specified in a license shall be processed and evaluated by a dosimetry processor:

(1) holding current personnel dosimetry accreditation from the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology; and

(2) approved in this accreditation process for the type of radiation or radiations included in the NVLAP program that most closely approximates the type of radiation or radiations for which the individual wearing the dosimeter is monitored.

(d) Each licensee shall ensure that individuals who are required to use an individual monitoring device follow appropriate procedures in regard to selection of the type of device, location where it is worn, period of use, and precautions to prevent exposures that are not occupational dose to that individual.

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§336.316. Conditions Requiring Individual Monitoring of External and Internal Occupational Dose.

Each licensee shall monitor exposures to radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits of this subchapter. As a minimum, the following monitoring is required:

(1) Each licensee shall monitor occupational exposure to radiation and shall supply and require the use of individual monitoring devices by:

(A) adults likely to receive, in 1 year from sources external to the body, a dose in excess of 10% of the limits in §336.305(a) of this title (relating to Occupational Dose Limits for Adults);

(B) minors and declared pregnant women likely to receive, in 1 year from sources external to the body, a dose in excess of 10% of any of the applicable limits in §336.311 of this title (relating to Occupational Dose Limits for Minors) or §336.312 of this title (relating to Dose to an Embryo/Fetus); and

(C) individuals entering a high or very high radiation area.

(2) Each licensee shall monitor (see §336.308 of this title (relating to Determination of Internal Exposure)) the occupational intake of radioactive material by and assess the committed effective dose equivalent to:

(A) adults likely to receive, in 1 year, an intake in excess of 10% of the applicable ALI(s) in Table I, Columns 1 and 2, of §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage); and

(B) minors and declared pregnant women likely to receive, in 1 year, a committed effective dose equivalent in excess of 0.05 rem (0.5 millisievert).

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§336.317. Control of Access to High Radiation Areas.

(a) The licensee shall ensure that each entrance or access point to a high radiation area has one or more of the following features:

(1) a control device that, upon entry into the area, causes the level of radiation to be reduced below that level at which an individual might receive a deep dose equivalent of 0.1 rem (1 millisievert) in 1 hour at 30 centimeters from the source of radiation from any surface that the radiation penetrates; or

(2) a control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry; or

(3) entryways that are locked, except during periods when access to the areas is required, with positive control over each individual entry.

(b) In place of the controls required by subsection (a) of this section for a high radiation area, the licensee may substitute continuous direct or electronic surveillance that is capable of preventing unauthorized entry.

(c) The licensee may apply to the commission for approval of alternative methods for controlling access to high radiation areas.

(d) The licensee shall establish the controls required by subsections (a) and (c) of this section in a way that does not prevent individuals from leaving a high radiation area.

(e) The licensee is not required to control each entrance or access point to a room or other area that is a high radiation area solely because of the presence of radioactive materials prepared for transport and packaged and labeled in accordance with the rules of the United States Department of Transportation provided that:

(1) the packages do not remain in the area longer than 3 days; and

(2) the dose rate at 1 meter from the external surface of any package does not exceed 0.01 rem (0.1 millisievert) per hour.

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§336.318. Control of Access to Very High Radiation Areas.

In addition to the requirements in §336.317 of this title (relating to Control of Access to High Radiation Areas), the licensee shall institute measures to ensure that an individual is not able to gain unauthorized or inadvertent access to areas in which radiation levels could be encountered at 500 rads (5 grays) or more in one hour at 1 meter from a source of radiation or any surface through which the radiation penetrates.

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§336.319. Use of Process or Other Engineering Controls.

The licensee shall use, to the extent practical, process or other engineering controls (e.g., containment or ventilation) to control the concentrations of radioactive material in air.

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§336.320. Use of Other Controls.

When it is not practical to apply process or other engineering controls to control the concentrations of radioactive material in air to values below those that define an airborne radioactivity area, the licensee shall, consistent with maintaining the total effective dose equivalent as low as is reasonably achievable, increase monitoring and limit intakes by one or more of the following means:

(1) control of access;

(2) limitation of exposure times;

(3) use of respiratory protection equipment; or

(4) other controls.

Adopted May 14, 1997 Effective June 5, 1997

§336.321. Use of Individual Respiratory Protection Equipment.

(a) If the licensee uses respiratory protection equipment to limit intakes under §336.320 of this title (relating to Use of Other Controls):

(1) The licensee shall use only respiratory protection equipment that is tested and certified or had certification extended by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH/MSHA), except as provided in paragraph (2) of this subsection.

(2) If the licensee wishes to use equipment that has not been tested or certified by NIOSH/MSHA, or has not had certification extended by NIOSH/MSHA, or for which there is no schedule for testing or certification, the licensee shall submit an application for authorized use of that equipment, including a demonstration by testing, or a demonstration on the basis of reliable test information, that the material and performance characteristics of the equipment are capable of providing the proposed degree of protection under anticipated conditions of use.

(3) The licensee shall implement and maintain a respiratory protection program that includes:

(A) air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate exposures;

(B) surveys and bioassays, as appropriate, to evaluate actual intakes;

(C) testing of respirators for operability immediately before each use;

(D) written procedures regarding selection, fitting, issuance, maintenance, and testing of respirators, including testing for operability immediately before each use; supervision and training of personnel; monitoring, including air sampling and bioassays; and recordkeeping; and

(E) determination by a physician before initial fitting of respirators, and at least every 12 months thereafter or periodically at a frequency determined by a physician, that the individual user is medically fit to use the respiratory protection equipment.

(4) The licensee shall issue a written policy statement on respirator usage covering:

(A) the use of process or other engineering controls, instead of respirators;

(B) the routine, nonroutine, and emergency use of respirators; and

(C) the length of periods of respirator use and relief from respirator use.

(5) The licensee shall advise each respirator user that the user may leave the area at any time for relief from respirator use in the event of equipment malfunction, physical or psychological distress, procedural or communication failure, significant deterioration of operating conditions, or any other conditions that might require this relief.

(6) The licensee shall use respiratory protection equipment within limitations for type and mode of use and shall provide proper visual, communication, and other special capabilities, such as adequate skin protection, when needed.

(b) When estimating exposure of individuals to airborne radioactive materials, the licensee may make allowance for respiratory protection equipment used to limit intakes under §336.320 of this title, provided that the following conditions, in addition to those in subsection (a) of this section, are satisfied:

(1) The licensee selects respiratory protection equipment that provides a protection factor (see §336.358, Appendix A, of this title (relating to Protection Factors for Respirators)) greater than the multiple by which peak concentrations of airborne radioactive materials in the working area are expected to exceed the values specified in §336.359, Appendix B, Table I, Column 3, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage). However, if the selection of respiratory protection equipment with a protection factor greater than the multiple defined in the preceding sentence is inconsistent with the goal specified in §336.320 of this title of keeping the total effective dose equivalent as low as is reasonably achievable (ALARA), the licensee may select respiratory protection equipment with a lower protection factor only if such a selection would result in keeping the total effective dose equivalent ALARA. The concentration of radioactive material in the air that is inhaled when respirators are worn may be initially estimated by dividing the average concentration in air, during each period of uninterrupted use, by the protection factor. If the exposure is later found to be greater than initially estimated,

the corrected value shall be used; if the exposure is later found to be less than initially estimated, the corrected value may be used.

(2) The licensee shall obtain authorization from the commission by license amendment before assigning respiratory protection factors in excess of those specified in §336.358, Appendix A, of this title. The commission may authorize a licensee to use higher protection factors on receipt of an application that:

(A) describes the situation for which a need exists for higher protection factors; and

(B) demonstrates that the respiratory protection equipment provides these higher protection factors under the proposed conditions of use.

(c) In an emergency, the licensee shall use as emergency equipment only respiratory protection equipment that has been specifically certified or had certification extended for emergency use by the NIOSH/MSHA.

(d) The licensee shall notify the executive director in writing at least 30 days before the date that respiratory protection equipment is first used under the provisions of either subsection (a) or (b) of this section.

Adopted May 14, 1997 Effective June 5, 1997

§336.322. Further Restrictions on the Use of Respiratory Protection Equipment.

The commission may impose restrictions in addition to those in §336.320 of this title (relating to Use of Other Controls), §336.321 of this title (relating to Use of Individual Respiratory Protection Equipment), and §336.358, Appendix A, of this title (relating to Protection Factors for Respirators) to:

(1) ensure that the respiratory protection program of the licensee is adequate to limit exposures of individuals to airborne radioactive materials; and

(2) limit the extent to which a licensee may use respiratory protection equipment instead of process or other engineering controls.

Adopted May 14, 1997 Effective June 5, 1997

§336.323. Security of Stored Radioactive Material.

The licensee shall secure from unauthorized removal or access licensed radioactive materials that are stored in unrestricted areas.

Adopted May 14, 1997 Effective June 5, 1997

§336.324. Control of Radioactive Material Not in Storage.

The licensee shall control and maintain constant surveillance of licensed radioactive material that is in an unrestricted area and that is not in storage.

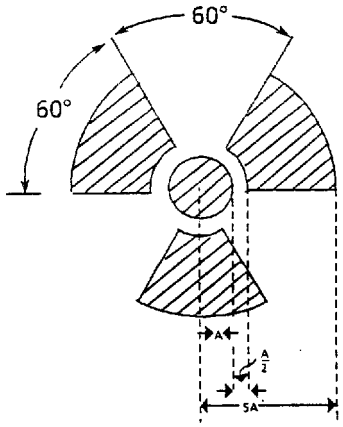
Adopted May 14, 1997 Effective June 5, 1997

§336.325. Caution Signs.

(a) Standard radiation symbol. Unless otherwise authorized by the commission, the symbol prescribed by this section shall use the colors magenta, or purple, or black on yellow background. The symbol prescribed is the three-bladed design as follows: Figure 1: 30 TAC §336.325(a)

RADIATION SYMBOL

(1) Cross-hatched area is to be magenta, or purple, or black, and
(2) The background is to be yellow.



(b) Additional information on signs and labels. In addition to the contents of signs and labels prescribed in this subchapter, the licensee shall provide, on or near the required signs and labels, additional information, as appropriate, to make individuals aware of potential radiation exposures and to minimize the exposures.

Adopted May 14, 1997 Effective June 5, 1997

§336.326. Posting Requirements.

(a) Posting of radiation areas. The licensee shall post each radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIATION AREA."

(b) Posting of high radiation areas. The licensee shall post each high radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, HIGH RADIATION AREA" or "DANGER, HIGH RADIATION AREA."

(c) Posting of very high radiation areas. The licensee shall post each very high radiation area with a conspicuous sign or signs bearing the radiation symbol and words "GRAVE DANGER, VERY HIGH RADIATION AREA."

(d) Posting of airborne radioactivity areas. The licensee shall post each airborne radioactivity area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, AIRBORNE RADIOACTIVITY AREA" or "DANGER, AIRBORNE RADIOACTIVITY AREA."

(e) Posting of areas or rooms in which licensed radioactive material is used or stored. The licensee shall post each area or room in which there is used or stored an amount of licensed material exceeding 10 times the quantity of such material specified in §336.360, Appendix C, of this title (relating to Quantities of Licensed Material Requiring Labeling) with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)."

Adopted May 14, 1997 Effective June 5, 1997

§336.327. Exceptions to Posting Requirements.

A licensee is not required to post caution signs in areas or rooms containing radioactive materials for periods of less than 8 hours, if each of the following conditions is met:

(1) The materials are constantly attended during these periods by an individual who takes the precautions necessary to prevent the exposure of individuals to radiation or radioactive materials in excess of the limits established in this subchapter; and

(2) The area or room is subject to the licensee's control.

Adopted May 14, 1997 Effective June 5, 1997

§336.328. Labeling Containers.

(a) The licensee shall ensure that each container of licensed material bears a durable, clearly visible label bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL." The label shall also provide sufficient information, such as the radionuclides present, an estimate of the quantity of radioactivity, the date for which the activity is estimated, radiation levels, kinds of materials, and mass enrichment, to permit individuals handling or using the containers, or working in the vicinity of the containers, to take precautions to avoid or minimize exposures.

(b) Each licensee shall, before removal or disposal of empty uncontaminated containers to unrestricted areas, remove or deface the radioactive material label or otherwise clearly indicate that the container no longer contains radioactive materials.

Adopted May 14, 1997 Effective June 5, 1997

§336.329. Exemptions to Labeling Requirements.

A licensee is not required to label:

(1) containers holding licensed material in quantities less than those listed in §336.360, Appendix C, of this title (relating to Quantities of Licensed Material Requiring Labeling);

(2) containers holding licensed material in concentrations less than those specified in Table III of §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage);

(3) containers attended by an individual who takes the precautions necessary to prevent the exposure of individuals in excess of the limits established by this subchapter;

(4) containers when they are in transport and packaged and labeled in accordance with the rules of the United States Department of Transportation (labeling of packages containing radioactive material is required by the United States Department of Transportation if the amount and type of radioactive material exceeds the limits for an excepted quantity or article as defined and limited by rules in 49 CFR 173.403(m) and (w) as amended through September 29, 1989, and 49 CFR 172.436-172.440 as amended through December 20, 1991);

(5) containers that are accessible only to individuals authorized to handle or use them, or to work in the vicinity of the containers, if the contents are identified to these individuals by a readily available written record. (Examples of containers of this type are containers in locations such as water-filled canals, storage vaults, or hot cells.) The record shall be retained as long as the containers are in use for the purpose indicated on the record; or

(6) installed manufacturing or process equipment, such as piping and tanks.

Adopted May 14, 1997 Effective June 5, 1997

§336.330. Procedures for Receiving and Opening Packages.

(a) Each licensee who expects to receive a package containing quantities of radioactive material in excess of a Type A quantity, as defined in §336.2 of this title (relating to Definitions), shall make arrangements to receive:

(1) the package when the carrier offers it for delivery; or

(2) notification of the arrival of the package at the carrier's terminal and to take possession of the package expeditiously.

(b) Each licensee shall monitor the external surfaces of a labeled (labeled with a Radioactive White I, Yellow II, or Yellow III label, as specified in United States Department of Transportation rules in 49 CFR 172.403 as amended through December 21, 1990, and 49 CFR 172.436-172.440 as amended through December 20, 1991) package for radioactive contamination unless the package contains:

(1) only radioactive material in the form of gas or in special form, as defined in §336.2 of this title; and

(2) quantities of radioactive material that are less than or equal to the Type A quantity, as defined in §336.2 of this title; and

(3) monitor all packages known to contain radioactive material for radioactive contamination and radiation levels if there is evidence of degradation of package integrity, such as packages that are crushed, wet, or damaged.

(c) The licensee shall perform the monitoring required by subsection (b) of this section as soon as practical after receipt of the package, but not later than 3 hours after the package is received at the licensee's facility if it is received during the licensee's normal working hours, or not later than 3 hours after the beginning of the next working day if it is received after working hours.

(d) The licensee shall immediately notify the final delivery carrier and, by telephone and telegram, mailgram, or facsimile, the executive director and the Texas Department of Health when:

(1) Removable radioactive surface contamination exceeds the limits of 10 CFR 71.87(i) as amended through September 28, 1995 (60 FedReg 50264) (relating to Routine Determinations).

(2) External radiation levels exceed the limits of 10 CFR 71.47 as amended through September 28, 1995 (60 FedReg 50264) (relating to External Radiation Standards for All Packages).

(e) Each licensee shall:

(1) establish, maintain, and retain written procedures for safely opening packages in which radioactive material is received; and

(2) ensure that the procedures are followed and that due consideration is given to special instructions for the type of package being opened.

Adopted May 14, 1997 Effective June 5, 1997

§336.331. General Requirements for Waste Disposal.

(a) Unless otherwise exempted, a licensee shall dispose of licensed material, as appropriate to the type of licensed material, only:

(1) by transfer to an authorized recipient as provided in §336.338 of this title (relating to Transfer for Disposal at Licensed Land Disposal Facility and Manifests) or in Subchapter H of Chapter 336 of this title (relating to Licensing Requirements for Near-Surface Land Disposal of Radioactive Waste);

(2) by transfer to a recipient authorized by commission license for receipt and disposal of byproduct material, as defined in §336.2, subparagraph (B), of this title (relating to Definitions), under Subchapter G of Chapter 336 of this title (relating to Licensing Requirements for Source Material (Uranium or Thorium) Recovery and Processing Facilities);

(3) by transfer to a recipient authorized in another state by license issued by the United States Nuclear Regulatory Commission or an Agreement State or to the United States Department of Energy;

(4) by decay in storage;

(5) by release in effluents within the limits specified in §336.313 of this title (relating to Dose Limits for Individual Members of the Public);

(6) as authorized under §336.332 of this title (relating to Method of Obtaining Approval of Proposed Disposal Procedures), §336.333 of this title (relating to Disposal by Release into Sanitary Sewerage), or §336.337 of this title (relating to Disposal of Specific Wastes); or

(7) as specifically authorized by commission license issued under Subchapter F of Chapter 336 of this title (relating to Licensing of Alternative Methods of Disposal of Radioactive Material), or Subchapters G or H of Chapter 336 of this title.

(b) A person who receives waste containing licensed material from other persons for processing or storage before disposal is subject to applicable rules of the Texas Department of Health, except as provided in subsection (c) of this section.

(c) Processing or storage of waste containing licensed material from other persons at a disposal facility by a person licensed for disposal under Subchapters G or H of Chapter 336 of this title shall be regulated in accordance with the provisions of §336.11, Appendix A, of this title (relating to Memorandum of Understanding Between the Texas Department of Health and the Texas Natural Resource Conservation Commission Regarding Radiation Control Functions).

Adopted May 14, 1997 Effective June 5, 1997

§336.332. Method of Obtaining Approval of Proposed Disposal Procedures.

(a) A person may file an application with the executive director for approval of proposed procedures, not otherwise authorized in this chapter, to dispose of radioactive material generated in the person's activities. Each application shall include:

(1) a description of the radioactive material involved, including the quantities and types of radioactive material, the levels of radioactivity, and the physical and chemical properties important to risk evaluation;

(2) a description of the proposed manner and conditions of disposal;

(3) an analysis and evaluation of pertinent information on the nature of the environment, including topographical, geological, meteorological, and hydrological characteristics and use of groundwater and surface water in the general area;

(4) the nature and location of other potentially affected facilities;

(5) analyses and procedures to ensure that doses are maintained as low as is reasonable achievable and within the dose limits of this subchapter; and

(6) any other information the executive director may require.

(b) A person holding a license issued under Subchapter F of Chapter 336 of this title (relating to Licensing of Alternative Methods of Disposal of Radioactive Material), Subchapter G of Chapter 336 of this title (relating to Licensing Requirements for Source Material (Uranium or Thorium) Recovery and Processing Facilities), or Subchapter H of Chapter 336 of this title (relating to Licensing Requirements for Near-Surface Land Disposal of Radioactive Waste) may apply for approval of proposed disposal procedures in accordance with subsection (a) of this section by requesting amendment of the license.

(c) A person applying for a license to be issued under Subchapter F, Subchapter G, or Subchapter H of Chapter 336 of this title may request approval of proposed disposal procedures in accordance with subsection (a) of this section as part of the license application.

(d) A person not subject to licensing under Subchapter G or Subchapter H of Chapter 336 of this title may request approval of proposed disposal procedures in accordance with subsection (a) of this section either by filing an application for a license under Subchapter F of Chapter 336 of this title or by requesting approval without a license. In some cases, approval of a limited disposal which meets the standards of this subchapter may be granted by the executive director to a person without a license, as authorized by law. Requests for approval without a license must be reviewed by the executive director on a case-by-case basis.

(e) Notwithstanding the provisions of this section, the commission shall not approve any application for a license to dispose of byproduct material on land that does not meet the transfer of land requirements under Subchapter G of Chapter 336 of this title.

(f) Notwithstanding the provisions of this section, the commission shall not approve any application for a license to receive radioactive waste from other persons for disposal on land not owned by the state or the federal government. The commission shall not issue a license to dispose of radioactive waste received from others except to a public entity specifically authorized by law for radioactive waste disposal.

Adopted May 14, 1997 Effective June 5, 1997

§336.333. Disposal by Release into Sanitary Sewerage.

A licensee may discharge licensed material into sanitary sewerage if each of the following conditions is satisfied:

(1) The material is readily soluble in water, or is readily dispersible biological material; and

(2) The quantity of licensed or other radioactive material that the licensee releases into the sewer in 1 month divided by the average monthly volume of water released into the sewer by the licensee does not exceed the concentration listed in Table III of §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage); and

(3) If more than one radionuclide is released, the licensee shall determine the fraction of the limit in Table III of §336.359, Appendix B, of this title represented by discharges into sanitary sewerage by dividing the actual monthly average concentration of each radionuclide released by the licensee into the sewer by the concentration of that radionuclide listed in Table III of §336.359, Appendix B, of this title, and the sum of the fractions for all of the radionuclides released shall not exceed 1; and

(4) The total quantity of licensed and other radioactive material that the licensee releases into the sanitary sewerage in a year does not exceed 5 curies (185 gigabecquerels) of hydrogen-3, 1 curie (37 gigabecquerels) of carbon-14, and 1 curie (37 gigabecquerels) of all other radioactive materials combined.

Adopted May 14, 1997 Effective June 5, 1997

§336.334. Disposal by Burial in Soil.

No licensee may dispose of radioactive material by burial in soil except as provided by §336.337 of this title (relating to Disposal of Specific Wastes) or by specific license authorization by the commission under §336.332 of this title (relating to Method of Obtaining Approval of Proposed Disposal Procedures), Subchapter F of Chapter 336 of this title (relating to Licensing of Alternative Methods of Disposal of Radioactive Material), Subchapter G of Chapter 336 of this title (relating to Licensing Requirements for Source Material (Uranium or Thorium) Recovery and Processing Facilities), or Subchapter H of Chapter 336 of this title (relating to Licensing Requirements for Near-Surface Land Disposal of Radioactive Waste).

Adopted May 14, 1997 Effective June 5, 1997

§336.335. Disposal by Release into Septic Tanks.

No licensee may discharge radioactive material into a septic tank system except by specific license authorization by the commission under §336.332 of this title (relating to Method of Obtaining Approval of Proposed Disposal Procedures).

Adopted May 14, 1997 Effective June 5, 1997

§336.336. Treatment or Disposal by Incineration.

Treatment of radioactive material by incineration, except in a form and concentration specified by §336.337 of this title (relating to Disposal of Specific Wastes), may be subject to applicable rules of the Texas Department of Health. Ash residue waste containing radioactive material shall be disposed of in accordance with §336.331 of this title (relating to General Requirements for Waste Disposal).

Adopted May 14, 1997 Effective June 5, 1997

§336.337. Disposal of Specific Wastes.

(a) A licensee may dispose of the following licensed material as if it were not radioactive:

(1) 0.05 microcurie (1.85 kilobecquerels), or less, of hydrogen-3, carbon-14, or iodine-125 per gram of medium used for liquid scintillation counting or in vitro clinical or in vitro laboratory testing; and

(2) 0.05 microcurie (1.85 kilobecquerels), or less, of hydrogen-3, carbon-14, or iodine-125 per gram of animal tissue, averaged over the weight of the entire animal.

(b) A licensee shall not dispose of tissue under subsection (a)(2) of this section in a manner that would permit its use either as food for humans or as animal feed.

(c) A licensee may, upon commission approval under subsection (b) of this section, dispose of licensed material listed in §336.365, Appendix H, of this title (relating to Radionuclide Concentration and Annual Activity Limits for Disposal in a Type I Municipal Solid Waste Facility or a Hazardous Waste Facility), provided that the licensed material does not exceed the specified concentration and annual activity limits, in a Type I municipal solid waste facility as defined in the commission's rules in Chapter 330 of this title (relating to Municipal Solid Waste), unless the licensed material is hazardous waste, or is combined with hazardous waste, as defined in Chapter 330 of this title. Licensed material listed in §336.365, Appendix H, of this title which does not exceed the specified concentration and annual activity limits and which is hazardous waste, or is combined with hazardous waste, may be disposed of at a hazardous waste disposal facility in accordance with the commission's rules in Chapter 335 of this title (relating to Industrial Solid Waste and Municipal Hazardous Waste). Disposals at a Type I municipal solid waste facility or a hazardous waste disposal facility must comply with other requirements for those facilities as set forth in Chapters 330 or 335 of this title, respectively.

(d) A licensee may apply for commission authorization, by license amendment, for the disposal of licensed material under subsection (c) of this section by submitting procedures for the following to the executive director:

(1) physical delivery of the material to the disposal facility;

(2) surveys to be performed for compliance with subsection (e)(1) of this section;

(3) maintaining secure packaging during transportation to the site; and

(4) maintaining records of any disposals made under this subsection.

(e) Each licensee who disposes of licensed material under subsections (a)-(d) of this section shall:

(1) make surveys adequate to assure that the limits specified in subsection (a) or (c) of this section are not exceeded; and

(2) remove or otherwise obliterate or obscure all labels, tags, or other markings which would indicate that the material or contents is radioactive.

(f) Each licensee who disposes of licensed material under subsections (a) - (d) of this section shall maintain records in accordance with §336.348 of this title (relating to Records of Waste Disposal). General licensees under this subsection are exempt from the other requirements of this subchapter and of Subchapter E of Chapter 336 of this title (relating to Notices, Instructions, and Reports to Workers and Inspections) with respect to the disposal authorized under this subsection.

(g) Material disposed of under this section is exempt from the requirements of §336.207 of this title (both relating to Preparation of Radioactive Material for Transport).

Adopted May 14, 1997 Effective June 5, 1997

§336.338. Transfer for Disposal at Licensed Land Disposal Facility and Manifests.

(a) Transfer of low-level radioactive waste by a waste generator, waste collector, or waste processor who ships this waste either directly, or indirectly through a collector or processor, to a licensed land disposal facility may also be subject to applicable rules of the Texas Department of Health. A commission licensee who transfers low-level radioactive waste for disposal at a licensed land disposal facility may also be subject to applicable rules of the Texas Department of Health with respect to transfers.

(b) Beginning March 1, 1998, a licensed land disposal facility operator shall use and comply with the requirements of §336.363, Appendix F, of this title (relating to Requirements for Receipt of Low-Level Radioactive Waste for Disposal at Licensed Land Disposal Facilities and Uniform Manifests). Before March 1, 1998, a land disposal facility operator shall use and comply with the requirements of §336.361, Appendix D, of this title (relating to Requirements for Receipt of
Low-Level Radioactive Waste for Disposal at Licensed Land Disposal Facilities and Manifests), unless the land disposal facility operator elects to use and comply with the requirements of §336.363, Appendix F of this title. Before March 1, 1998, a licensed land disposal facility operator may require that shipments of waste received at the facility have the uniform manifest prescribed in §336.363, Appendix F of this title, or the manifest prescribed in §336.361, Appendix D of this title.

Adopted May 14, 1997 Effective June 5, 1997

§336.339. Texas Department of Health Inspection and Regulation of Shipments of Radioactive Waste.

(a) Each shipment of radioactive waste to a licensed land disposal facility in Texas is subject to inspection by the Texas Department of Health before shipment.

(b) Shipment and transportation of radioactive waste to a licensed land disposal facility in Texas are subject to applicable rules of the Texas Department of Health, United States Department of Transportation, and United States Nuclear Regulatory Commission.

Adopted May 14, 1997 Effective June 5, 1997

§336.340. Compliance with Environmental and Health Protection Regulations.

Nothing in this subchapter relieves the licensee from complying with other applicable federal, state, and local regulations governing any other toxic or hazardous properties of materials that may be disposed of under the rules in this chapter.

Adopted May 14, 1997 Effective June 5, 1997

§336.341. General Requirements for Recordkeeping.

(a) Each licensee shall use the units curie, rad, and rem, including multiples and subdivisions, and shall clearly indicate the units of all quantities on records required by this subchapter. Disintegrations per minute may be indicated on records of surveys performed to determine compliance with §336.357 of this title (relating to Surface Contamination Limits for Facilities and Equipment) and §336.364, Appendix G, of this title (relating to Acceptable Surface Contamination Levels).

(b) Notwithstanding the requirements of subsection (a) of this section, information on shipment manifests for wastes received at a licensed land disposal facility, as required by §336.338(b) of this title (relating to Transfer for Disposal at Licensed Land Disposal Facility and Manifests), shall be recorded in International System of Units (SI) units (becquerel, gray, and sievert) or in SI and units as specified in subsection (a) of this section.

(c) The licensee shall make a clear distinction among the quantities entered on the records required by this subchapter, such as total effective dose equivalent, shallow-dose equivalent, eye dose equivalent, deep-dose equivalent, and committed effective dose equivalent.

Adopted May 14, 1997 Effective June 5, 1997

§336.342. Records of Radiation Protection Programs.

(a) Each licensee shall maintain records of the radiation protection program, including:

(1) the provisions of the program; and

(2) audits and other reviews of program content and implementation.

(b) The licensee shall retain the records required by subsection (a)(1) of this section until the commission terminates each pertinent license requiring the record. The licensee shall retain the records required by subsection (a)(2) of this section for 3 years after the record is made.

Adopted May 14, 1997 Effective June 5, 1997

§336.343. Records of Surveys.

(a) Each licensee shall maintain records showing the results of surveys and calibrations required by §336.315 of this title (relating to General Requirements for Surveys and Monitoring) and §336.330(b) of this

title (relating to Procedures for Receiving and Opening Packages). The licensee shall retain these records for 3 years after the record is made.

(b) The licensee shall retain each of the following records until the commission terminates each pertinent license requiring the record:

(1) results of surveys to determine the dose from external sources of radiation and used, in the absence of or in combination with individual monitoring data, in the assessment of individual dose equivalents. This includes those records of results of surveys to determine the dose from external sources and used, in the absence of or in combination with individual monitoring data, in the assessment of individual dose equivalents required under the standards for protection against radiation in effect before January 1, 1994;

(2) results of measurements and calculations used to determine individual intakes of radioactive material and used in the assessment of internal dose. This includes those records of the results of measurements and calculations used to determine individual intakes of radioactive material and used in the assessment of internal dose required under the standards for protection against radiation in effect before January 1, 1994.

(3) results of air sampling, surveys, and bioassays required under §336.321(a)(3)(A) and (B) of this title (relating to Use of Individual Respiratory Protection Equipment). This includes those records showing the results of air sampling, surveys, and bioassays required under the standards for protection against radiation in effect before January 1, 1994.

(4) results of measurements and calculations used to evaluate the release of radioactive effluents to the environment. This includes those records of the results of measurements and calculations used to evaluate the release of radioactive effluents to the environment required under the standards for protection against radiation in effect before January 1, 1994.

Adopted May 14, 1997 Effective June 5, 1997

§336.344. Records of Prior Occupational Dose.

The licensee shall retain the records of prior occupational radiation dose and exposure history as specified in §336.309 of this title (relating to Determination of Prior Occupational Dose) on form "Cumulative Occupational Exposure History" (§336.367, Appendix J of this title (relating to Cumulative Occupational Exposure History)) or equivalent until the commission terminates each pertinent license requiring this record. The licensee shall retain records used in preparing form "Cumulative Occupational Exposure History" (§336.367, Appendix J of this title) or equivalent for 3 years after the record is made. This includes records required under the standards for protection against radiation in effect before January 1, 1994.

Adopted May 14, 1997 Effective June 5, 1997

§336.345. Records of Planned Special Exposures.

(a) For each use of the provisions of §336.310 of this title (relating to Planned Special Exposures) for planned special exposures, the licensee shall maintain records that describe:

(1) the exceptional circumstances requiring the use of a planned special exposure;

(2) the name of the management official who authorized the planned special exposure and a copy of the signed authorization;

(3) what actions were necessary;

(4) why the actions were necessary;

(5) what precautions were taken to assure that doses were maintained as low as is reasonable achievable;

(6) what individual and collective doses were expected to result; and

(7) the doses actually received in the planned special exposure.

(b) The licensee shall retain the records until the commission terminates each pertinent license requiring these records.

Adopted May 14, 1997 Effective June 5, 1997

§336.346. Records of Individual Monitoring Results.

(a) Recordkeeping requirement. Each licensee shall maintain records of doses received by all individuals for whom monitoring was required under §336.316 of this title (relating to Conditions Requiring Individual Monitoring of External and Internal Occupational Dose) and records of doses received during planned special exposures, accidents, and emergency conditions. Assessments of dose equivalent and records made using units in effect before January 1, 1994, need not be changed. These records shall include, when applicable:

(1) the deep-dose equivalent to the whole body, eye dose equivalent, shallow-dose equivalent to the skin, and shallow-dose equivalent to the extremities;

(2) the estimated intake or body burden of radionuclides (see §336.306 of this title (relating to Compliance with Requirements for Summation of External and Internal Doses));

(3) the committed effective dose equivalent assigned to the intake or body burden of radionuclides;

(4) the specific information used to calculate the committed effective dose equivalent under §336.308(c) of this title (relating to Determination of Internal Exposure);

(5) the total effective dose equivalent when required by §336.306 of this title; and

(6) the total of the deep-dose equivalent and the committed dose to the organ receiving the highest total dose.

(b) Recordkeeping frequency. The licensee shall make entries of the records specified in subsection (a) of this section at intervals not to exceed 1 year.

(c) Recordkeeping format. The licensee shall maintain the records specified in subsection (a) of this section on form "Occupational Exposure Record for a Monitoring Period" (see §336.368, Appendix K of this title (relating to Occupational Exposure Record for a Monitoring Period)), in accordance with the instructions for that form, or in clear and legible records containing all the information required by form.

(d) Recordkeeping maintenance. The licensee shall maintain the records of dose to an embryo/fetus with the records of dose to the declared pregnant woman. The declaration of pregnancy, including the estimated date of conception, shall also be kept on file but may be maintained separately from the dose records.

(e) Recordkeeping retention. The licensee shall retain each required form or record until the commission terminates each pertinent license requiring the form or record. This includes records required under the standards for protection against radiation in effect before January 1, 1994.

Adopted May 14, 1997 Effective June 5, 1997

§336.347. Records of Dose to Individual Members of the Public.

(a) Each licensee shall maintain records sufficient to demonstrate compliance with the dose limit for individual members of the public. See §336.313 of this title (relating to Dose Limits for Individual Members of the Public).

(b) The licensee shall retain the records required by subsection (a) of this section until the commission terminates each pertinent license requiring the record.

Adopted May 14, 1997 Effective June 5, 1997

§336.348. Records of Waste Disposal.

(a) Each licensee shall maintain records of the disposal of licensed materials made under §336.332 of this title (relating to Method of Obtaining Approval of Proposed Disposal Procedures), §336.333 of this title (relating to Disposal by Release into Sanitary Sewerage), §336.336 of this title (relating to Treatment or Disposal by Incineration), §336.337 of this title (relating to Disposal of Specific Wastes); made by transfer to an authorized recipient under §336.331(a)(1) - (3) of this title (relating to General Requirements for Waste Disposal); or made under license authorization issued under Subchapter F of this chapter (relating to Licensing of Alternative Methods of Disposal of Radioactive Material), Subchapter G of this chapter (relating to Licensing Requirements for Source Material (Uranium or Thorium) Recovery and Processing Facilities), or Subchapter H of this chapter (relating to Licensing Requirements for Near-Surface Land Disposal of Radioactive Waste). Each licensee shall also maintain records of the disposal of licensed

materials by burial in soil, including burials authorized by Texas Department of Health rules before May 1977.

(b) The licensee shall retain the records required by subsection (a) of this section until the commission terminates each pertinent license requiring the record. This includes records required under the standards for protection against radiation in effect before January 1, 1994.

Adopted May 14, 1997 Effective June 5, 1997

§336.349. Form of Records.

Each record required by this subchapter shall be legible throughout the specified retention period. The record shall be the original or a reproduced copy or a microform, provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records, such as letters, drawings, and specifications, shall include all pertinent information, such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

Adopted May 14, 1997 Effective June 5, 1997

§336.350. Reports of Stolen, Lost, or Missing Licensed Radioactive Material.

(a) Telephone reports. Each licensee shall report to the executive director or staff by telephone as follows:

(1) immediately after its occurrence becomes known to the licensee, any stolen, lost, or missing licensed radioactive material in an aggregate quantity equal to or greater than 1,000 times the quantity specified in §336.360, Appendix C, of this title (relating to Quantities of Licensed Material Requiring Labeling) under those circumstances that it appears to the licensee that an exposure could result to individuals in unrestricted areas; or

(2) within 30 days after its occurrence becomes known to the licensee, any stolen, lost, or missing licensed radioactive material in an aggregate quantity greater than 10 times the quantity specified in §336.360, Appendix C, of this title that is still missing.

(b) Written reports. Each licensee required to make a report under subsection (a) of this section shall, within 30 days after making the telephone report, make a written report to the executive director setting forth the following information:

(1) a description of the licensed radioactive material involved, including the kind, quantity, and chemical and physical form;

(2) a description of the circumstances under which the loss or theft occurred;

(3) a statement of disposition, or probable disposition, of the licensed material involved;

(4) exposures of individuals to radiation, circumstances under which the exposures occurred, and the possible total effective dose equivalent to persons in unrestricted areas;

(5) actions that have been taken, or will be taken, to recover the licensed material; and

(6) procedures or measures that have been, or will be, adopted to ensure against a recurrence of the loss or theft of licensed material.

(c) Supplemental reports. Subsequent to filing the written report, the licensee shall also report any additional substantive information on the loss or theft within 30 days after the licensee learns of this information.

(d) Exposure reports. The licensee shall prepare any report filed with the executive director under this section so that names of individuals who may have received exposure to radiation or radioactive material are stated in a separate and detachable part of the report.

Adopted May 14, 1997 Effective June 5, 1997

§336.351. Notification of Incidents.

(a) Immediate notification. Notwithstanding any other requirements for notification, each licensee shall immediately report to the executive director or staff each event involving licensed radioactive material possessed by the licensee that may have caused or threatens to cause any of the following conditions:

(1) an individual to receive:

(A) a total effective dose equivalent of 25 rems (0.25 sievert) or more;

(B) an eye dose equivalent of 75 rems (0.75 sievert) or more; or

(C) a shallow-dose equivalent to the skin or extremities or a total organ dose equivalent of 250 rads (2.5 grays) or more; or

(2) the release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake 5 times the annual limit on intake (ALI). This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures.

(b) Twenty-four hour notification. Each licensee shall, within 24 hours of discovery of the event, report to the executive director or staff any event involving loss of control of licensed material possessed by the licensee that may have caused, or threatens to cause, any of the following conditions:

(1) an individual to receive, in a period of 24 hours:

(A) total effective dose equivalent exceeding 5 rems (0.05 sievert);

(B) an eye dose equivalent exceeding 15 rems (0.15 sievert); or

(C) a shallow-dose equivalent to the skin or extremities or a total organ dose equivalent exceeding 50 rems (0.5 sievert); or

(2) the release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake in excess of one ALI. This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures.

(c) Format of notification. The licensee shall prepare any report filed with the executive director or staff under this section so that names of individuals who may have received exposure to radiation or radioactive material are stated in a separate and detachable part of the report.

(d) Confirmation of notification. Licensees shall make the reports required by subsections (a) and (b) of this section by telephone and shall confirm the telephone report within 24 hours by telegram, mailgram, or facsimile.

(e) Exception to notification. The provisions of this section do not apply to doses that result from planned special exposures, provided those doses are within the limits for planned special exposures and are reported under §336.353 of this title (relating to Reports of Planned Special Exposures).

Adopted May 14, 1997 Effective June 5, 1997

§336.352. Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Limits.

(a) Reportable events. In addition to the notification required by §336.351 of this title (relating to Notification of Incidents), each licensee shall submit a written report to the executive director within 30 days after learning of any of the following occurrences:

(1) any incident for which notification is required by §336.351 of this title; or

(2) doses in excess of any of the following:

(A) the occupational dose limits for adults in §336.305 of this title (relating to Occupational Dose Limits for Adults);

(B) the occupational dose limits for minors in §336.311 of this title (relating to Occupational Dose Limits for Minors);

(C) the limits for an embryo/fetus of a declared pregnant woman in §336.312 of this title (relating to Dose to an Embryo/Fetus);

(D) the limits for an individual member of the public in §336.313 of this title (relating to Dose Limits for Individual Members of the Public); or

(E) any applicable limit in the license; or

(3) levels of radiation or concentrations of radioactive material in:

(A) a restricted area in excess of applicable limits in the license; or

(B) an unrestricted area in excess of 10 times any applicable limit set forth in this subchapter or in the license, whether or not involving exposure of any individual in excess of the limits in §336.313 of this title; or

(4) for licensees subject to the provisions of the United States Environmental Protection Agency's generally applicable environmental radiation standards in 40 CFR Part 190 as amended through January 13, 1977 (42 FedReg 2860) (relating to Environmental Radiation Protection Standards for Nuclear Power Operations), levels of radiation or releases of radioactive material in excess of those standards or of license conditions related to those standards.

(b) Contents of reports.

(1) Each report required by subsection (a) of this section shall describe the extent of exposure of individuals to radiation and radioactive material, including, as appropriate:

(A) estimates of each individual's dose;

(B) the levels of radiation and concentrations of radioactive material involved;

(C) the cause of the elevated exposures, dose rates, or concentrations; and

(D) corrective steps taken or planned to ensure against a recurrence, including the schedule for achieving conformance with applicable limits, generally applicable environmental standards, and associated license conditions.

(2) Each report filed under subsection (a) of this section shall include for each individual exposed the name, social security number, and date of birth. With respect to the limit for the embryo/fetus in §336.312 of this title, the identifiers should be those of the declared pregnant woman. The report shall be prepared so that this information is stated in a separate and detachable part of the report.

Adopted May 14, 1997 Effective June 5, 1997

§336.353. Reports of Planned Special Exposures.

The licensee shall submit a written report to the executive director within 30 days following any planned special exposure conducted in accordance with §336.310 of this title (relating to Planned Special Exposures), informing the executive director that a planned special exposure was conducted and indicating the date the planned special exposure occurred and the information required by §336.345 of this title (relating to Records of Planned Special Exposures).

Adopted May 14, 1997 Effective June 5, 1997

§336.354. Reports to Individuals.

(a) Reports to individuals of exceeding dose limits. When a licensee is required, under the provisions of §336.352 of this title (relating to Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Limits), §336.353 of this title (relating to Reports of Planned Special Exposures), or §336.355 of this title (relating to Reports of Individual Monitoring), to report to the executive director any exposure of an identified occupationally-exposed individual, or an identified member of the public, to radiation or radioactive material, the licensee shall also provide a copy of the report submitted to the executive director to the individual. This report must be transmitted at a time not later than the transmittal to the executive director.

(b) Notifications and reports to individuals. In addition to the reports to individuals under subsection (a) of this section, each licensee shall provide notification and reports to individuals of exposure to radiation or radioactive material as specified in §336.405 of this title (relating to Notifications and Reports to Individuals).

Adopted May 14, 1997 Effective June 5, 1997

§336.355. Reports of Individual Monitoring.

(a) Each person licensed by the commission to receive radioactive waste from other persons for disposal under Subchapter H of Chapter 336 of this title (relating to Licensing Requirements for Near-Surface Land Disposal of Radioactive Waste) shall submit an annual report of the results of individual monitoring carried out by the licensee for each individual for whom monitoring was required by §336.316 of this title (relating to Conditions Requiring Individual Monitoring of External and Internal Occupational Dose) during that year. The licensee may include additional data for individuals for whom monitoring was provided but not required. The licensee shall use the form "Occupational Exposure Record for a Monitoring Period" (see §336.368, Appendix K of this title (relating to Occupational Exposure Record for a Monitoring Period)) or a clear and legible record containing all the information required by that form.

(b) The licensee shall submit the report required by subsection (a) of this section, covering the preceding year, to the executive director on or before April 30 of each year.

Adopted May 14, 1997 Effective June 5, 1997

§336.356. Soil and Vegetation Contamination Limits.

(a) No licensee may possess, receive, use, or transfer licensed radioactive material in such a manner as to cause contamination of soil or vegetation in unrestricted areas to the extent that the contamination exceeds the background level by more than:

(1) the concentration limits, based on dry weight, specified in §336.366, Appendix I, of this title (relating to Soil and Vegetation Contamination Limits for Selected Radionuclides);

(2) the concentration limits, based on dry weight, taken from the concentrations in Table III of §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage) with the units converted from microcuries per milliliter (µCi/ml) to microcuries per gram (µCi/g), for radionuclides not specified in §336.366, Appendix I, of this title, except as provided in paragraphs (3) and (4) of this subsection;

(3) for radium-226 or radium-228 in soil, the following limits, based on dry weight, averaged over any 100 square meters of area:

(A) 5 picocuries/gram (pCi/g), averaged over the first 15 centimeters of soil below the surface;

(B) 15 pCi/g, averaged over 15-centimeter thick layers of soil more than 15 centimeters below the surface; and

(4) for radium-226 or radium-228 in vegetation, 5 pCi/g, based on dry weight.

(b) Where combinations of radionuclides are involved, the sum of the ratios between the concentrations present and the limits specified in subsection (a) of this section shall not exceed 1.

(c) Notwithstanding the limits set forth in subsection (a) of this section, each licensee shall make every reasonable effort to maintain any contamination of soil or vegetation as low as is reasonably achievable (ALARA).

(d) If contamination caused by the licensee is detected in an unrestricted area, the licensee shall decontaminate any unrestricted area which is contaminated above the limits specified in subsection (a) of this section.

(e) Not withstanding the limits set forth in subsection (a) of this section, contamination levels must be maintained in unrestricted areas so that no individual member of the public will receive an effective dose equivalent in excess of 0.1 rem above background (100 mrem/year) in a year.

(f) A licensee shall decommission its licensed facilities and land for release for unrestricted use. No licensee shall vacate a facility or land, or release a facility or land for unrestricted use, until the annual total effective dose equivalent to a member of the public resulting from radioactive material remaining from licensed activities (excluding radium and its decay products) does not exceed 0.025 rem/year (25 mrem/year) above background. The concentration for radium in soil shall be equivalent to or below the limits set forth in subsection (a) of this section. Notwithstanding the limits set forth in this subsection, each licensee shall make every reasonable effort to maintain any contamination of soil or vegetation ALARA. The licensee shall conduct all necessary radiation surveys and modelling and shall provide reports and documentation to demonstrate that the requirements for release for unrestricted use have been met. The executive director may require the licensee to provide any other information necessary to demonstrate that the facilities and land are suitable for release for unrestricted use.

§336.357. Surface Contamination Limits for Facilities and Equipment.

(a) Before vacating any facility or releasing any facility or equipment for unrestricted use, each licensee shall ensure that radioactive contamination has been removed to levels as low as is reasonably achievable.

(b) No licensee may vacate a facility or release a facility or equipment for unrestricted use until radioactive surface contamination levels are below the limits specified in §336.364, Appendix G, of this title (relating to Acceptable Surface Contamination Levels). The licensee shall conduct radiation surveys and provide reports and documentation to demonstrate that the requirements for release have been met. The executive director may also require the licensee to provide other information as may be necessary to demonstrate that the facilities and equipment are suitable for release.

(c) In addition to meeting the surface contamination limits of subsection (b) of this section, porous materials (e.g., concrete), which are to be released for unrestricted use, shall be evaluated to determine whether radioactive materials have penetrated to the interior of the material. If radioactive contamination has penetrated into the material, analysis of the average concentration, in picocuries per gram, shall be made. The material may be released for unrestricted use if the radionuclide concentrations do not exceed the limits specified for soil in §336.356(a) of this title (relating to Soil and Vegetation Contamination Limits).

Adopted May 14, 1997 Effective June 5, 1997

§336.358. Appendix A. Protection Factors for Respirators.

Protection Factors for Respirators[1]

		Protection Factors[4]		Tested & Certified Equipment
Description[2]	Modes[3]	Particulates only	Particulates, gases, vapors[5]	National Institute for Occupational Safety and Health/ Mine Safety and Health Administration tests for permissibility
I. AIR-PURIFYING RESPIRATORS[6]				
Facepiece, half-mask[7]	NP	10		30 CFR Part 11, Subpart K
Facepiece, full	NP	50		
Facepiece, half-mask, full, or hood	PP	1,000		
II. ATMOSPHERE-SUPPLYING RESPIRATORS				
1. Air-line respirator				
Facepiece, half-mask	CF		1,000	
Facepiece, half-mask	D		5	
Facepiece, full	CF		2,000	
Facepiece, full	D		5	30 CFR Part 11, Subpart J
Facepiece, full	PD		2,000	
Hood	CF		[8]	
Suit	CF		[9]	[10]
2. Self-contained breathing apparatus (SCBA)				
Facepiece, full	D		50	
Facepiece, full	PD		10,000[11]	30 CFR Part 11, Subpart H
Facepiece, full	RD		50	
Facepiece, full	RP		5,000[12]	
III. COMBINATION RESPIRATORS				
Any combination of air-purifying and atmosphere-supplying respirators	Protection factor for type and mode of operation as listed above			30 CFR Part 11, §11.63(b)

Notes

1. For use in the selection of respiratory protection equipment to be used only where the contaminants have been identified and the concentrations, or possible concentrations, are known.

2. Only for shaven faces and where nothing interferes with the seal of tight-fitting facepieces against the skin. Hoods and suits are excepted.

3. The mode symbols are defined as follows:

CF	= continuous flow
D	= demand
NP	= negative pressure (i.e., negative phase during inhalation)
PD	= pressure demand (i.e., always positive pressure)
PP	= positive pressure
RD	= demand, recirculating (closed circuit)
RP	= pressure demand, recirculating (closed circuit)

4. Protection Factors:

(a) The protection factor is a measure of the degree of protection afforded by a respirator, defined as the ratio of the concentration of airborne radioactive material outside the respiratory protection equipment to that inside the equipment, usually inside the facepiece, under conditions of use. It is applied to the ambient airborne concentration to estimate the concentrations inhaled by the wearer according to the following formula:

$$\text{concentration inhaled} = \frac{\text{ambient airborne concentration}}{\text{protection factor}}$$

(b) The protection factors apply:

(1) only for individuals trained in using respirators and wearing properly fitted respirators that are used and maintained under supervision in a well-planned respiratory protective program;

(2) for air-purifying respirators only when high efficiency particulate filters (above 99.97% removal efficiency by thermally-generated 0.3 micrometer dioctyl phthalate (DOP) test or equivalent) are used in atmospheres not deficient in oxygen and not containing radioactive gas or vapor respiratory hazards;

(3) when no adjustment is to be made for the use of sorbents against radioactive material in the form of gases or vapors; and

(4) for atmosphere-supplying respirators only when supplied with adequate respirable air. Respirable air shall be provided of the quality and quantity required in accordance with the National Institute for Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA) certification (described in 30 CFR Part 11). Oxygen and air shall not be used in the same apparatus.

5. Excluding radioactive contaminants that present an absorption or submersion hazard. For tritium oxide, approximately one-third of the intake occurs by absorption through the skin so that an overall protection factor of less than 2 is appropriate when atmosphere-supplying respirators are used to protect against tritium oxide. If the protection factor for a device is 5, the effective protection factor for tritium is about 1.4; for

devices with protection factors of 10, the effective factor for tritium oxide is about 1.7; and for devices with protection factors of 100 or more, the effective factor for tritium oxide is about 1.9. Air-purifying respirators are not suitable for protection against tritium oxide. See also note 9 concerning supplied-air suits.

6. Canisters and cartridges shall not be used beyond service-life limitations.

7. Under-chin type only. This type of respirator is not satisfactory for use where it might be possible (e.g., if an accident or emergency were to occur) for the ambient airborne concentrations to reach instantaneous values greater than 10 times the pertinent values in §336.359, Appendix B, Table I, Column 3, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage). This type of respirator is not suitable for protection against plutonium or other high-toxicity materials. The mask is to be tested for fit prior to use, each time it is donned.

8. Hoods:

(a) Equipment shall be operated in a manner that ensures that proper air flow-rates are maintained. A protection factor of no more than 1,000 may be utilized for tested-and-certified supplied-air hoods when a minimum air flow of 6 cubic feet/minute (0.17 cubic meter/minute) is maintained and calibrated air-line pressure gauges or flow-measuring devices are used. A protection factor of up to 2,000 may be used for tested and certified hoods only when the air flow is maintained at the manufacturer's recommended maximum rate for the equipment, this rate is greater than 6 cubic feet/minute (0.17 cubic meter/minute), and calibrated air-line pressure gauges or flow-measuring devices are used.

(b) The design of the supplied-air hood or helmet (with a minimum flow of 6 cubic feet/minute (0.17 cubic meter/minute) of air) may determine its overall efficiency and the protection it provides. For example, some hoods aspirate contaminated air into the breathing zone when the wearer works with hands over head. This aspiration may be overcome if a short cape-like extension to the hood is worn under a coat or overalls. Other limitations specified by the approval agency shall be considered before using a hood in certain types of atmospheres. See note 9.

9. Appropriate protection factors shall be determined, taking into account the design of the suit and its permeability to the contaminant under conditions of use. There shall be a standby rescue person equipped with a respirator or other apparatus appropriate for the potential hazards and communications equipment whenever supplied-air suits are used.

10. No approval schedules are currently available for this equipment. Equipment is to be evaluated by testing or on the basis of reliable test information.

11. This type of respirator may provide greater protection and be used as an emergency device in unknown concentrations for protection against inhalation hazards. External radiation hazards and other limitations to permitted exposure, such as skin absorption, must be taken into account in those circumstances.

12. Quantitative fit testing shall be performed on each individual, and no more than 0.02% leakage is allowed with this type of apparatus. Perceptible outward leakage of gas from this or any positive pressure self-contained breathing apparatus is unacceptable because service life will be reduced substantially. Special training in the use of this type of apparatus shall be provided to the wearer.

Note 1. Protection factors for respirators as may be approved by the United States Bureau of Mines/(NIOSH), according to applicable approvals for respirators for type and mode of use to protect against airborne radionuclides, may be used to the extent that they do not exceed the protection factors listed in this table. The protection factors listed in this table may not be appropriate to circumstances where chemical or other respiratory hazards exist in addition to radioactive hazards. The selection and use of respirators for those circumstances shall take into account applicable approvals of the United States Bureau of Mines/NIOSH.

Note 2. Radioactive contaminants for which the concentration values in §336.359, Appendix B, Table I, Column 3, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage) are based on internal dose due to inhalation may, in addition, present external exposure hazards at higher concentrations. Under these circumstances, limitations on occupancy may have to be governed by external dose limits.

Adopted May 14, 1997 Effective June 5, 1997

§336.359. Appendix B Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage.

(a) Introduction. For each radionuclide, Table I indicates the chemical form that is to be used for selecting the appropriate ALI or DAC value. The ALIs and DACs for inhalation are given for an aerosol with an activity median aerodynamic diameter (AMAD) of 1 micrometer and for three classes (D,W,Y) of radioactive material, which refer to their retention (approximately days, weeks, or years) in the pulmonary region of the lung. This classification applies to a range of clearance half-times for D of less than 10 days, for W from 10 to 100 days, and for Y greater than 100 days.

(1) The class (D, W, or Y) given in the column headed "Class" applies only to the inhalation ALIs and DACs given in Table I, Columns 2 and 3. Table II provides concentration limits for airborne and liquid effluents released to the general environment. Table III provides concentration limits for discharges to sanitary sewerage.

(2) The values in Tables I, II, and III are presented in the computer "E" notation. In this notation, a value of 6E-02 represents a value of 6×10^{-2} or 0.06, 6E+2 represents 6×10^{2} or 600, and 6E+0 represents 6×10^{0} or 6. Values are given in units of microcuries (µCi) or microcuries per milliliter (µCi/ml), as indicated.

(b) Table I, "Occupational Values". Note that the columns in Table I of this appendix captioned "Oral Ingestion ALI," "Inhalation ALI," and "DAC," are applicable to occupational exposure to radioactive material.

(1) The ALIs in this appendix are the annual intakes of a given radionuclide by "reference man" that would result in either a committed effective dose equivalent of 5 rems (0.05 sievert) (stochastic ALI) or a committed dose equivalent of 50 rems (0.5 sievert) to an organ or tissue (non-stochastic ALI). The stochastic ALIs were derived to result in a risk, due to irradiation of organs and tissues, comparable to the risk associated with deep dose equivalent to the whole body of 5 rems (0.05 sievert). The derivation includes multiplying the committed dose equivalent to an organ or tissue by a weighting factor, w_T. This weighting

factor is the proportion of the risk of stochastic effects resulting from irradiation of the organ or tissue, T, to the total risk of stochastic effects when the whole body is irradiated uniformly. The values of w_T are listed under the definition of "weighting factor" in §336.2 of this title (relating to Definitions). The non-stochastic ALIs were derived to avoid non-stochastic effects, such as prompt damage to tissue or reduction in organ function.

(2) A value of $w_T = 0.06$ is applicable to each of the five organs or tissues in the "remainder" category receiving the highest dose equivalents, and the dose equivalents of all other remaining tissues may be disregarded. The following parts of the GI tract -- stomach, small intestine, upper large intestine, and lower large intestine -- are to be treated as four separate organs.

(3) Note that the dose equivalents for an extremity, skin, and lens of the eye are not considered in computing the committed effective dose equivalent but are subject to limits that must be met separately. When an ALI is defined by the stochastic dose limit, this value alone is given.

(4) When an ALI is determined by the non-stochastic dose limit to an organ, the organ or tissue to which the limit applies is shown, and the ALI for the stochastic limit is shown in parentheses. The following abbreviated organ or tissue designations are used:

(A) LLI wall = lower large intestine wall;

(B) St wall = stomach wall;

(C) Blad wall = bladder wall; and

(D) Bone surf = bone surface.

(5) The use of the ALIs listed first, the more limiting of the stochastic and non-stochastic ALIs, will ensure that non-stochastic effects are avoided and that the risk of stochastic effects is limited to an acceptably low value. If, in a particular situation involving a radionuclide for which the non-stochastic ALI is limiting, use of that non-stochastic ALI is considered unduly conservative, the licensee may use the stochastic ALI to determine the committed effective dose equivalent. However, the licensee shall also ensure that the 50-rem (0.5 sievert) dose equivalent limit for any organ or tissue is not exceeded by the sum of the external deep dose equivalent plus the internal committed dose equivalent to that organ (not the effective dose). For the case where there is no external dose contribution, this would be demonstrated if the sum of the fractions of the nonstochastic ALIs (ALI_{ns}) that contribute to the committed dose equivalent to the organ receiving the highest dose does not exceed 1 (i.e., $\sum$ (intake in µCi of each radionuclide/ALI_{ns}) $\leq$ 1.0). If there is an external deep-dose equivalent contribution of H_d, then this sum must be less than 1 - (H_d/50), instead of $\leq$ 1.0.

(6) The DAC values are derived limits intended to control chronic occupational exposures. The relationship between the DAC and the ALI is given by: Figure 1: 30 TAC §336.359(b)(6)

$$DAC = ALI(\text{in } \mu Ci)/(2000 \text{ hours per working year} \times 60 \text{ minutes/hour} \times 2 \times 10^4 \text{ ml per minute}) = (ALI/2.4 \times 10^9)\ \mu Ci/ml,$$

where 2×10^4 ml is the volume of air breathed per minute at work by "reference man" under working conditions of light work.

(7) The DAC values relate to one of two modes of exposure: either external submersion or the internal committed dose equivalents resulting from inhalation of radioactive materials. The DAC values based upon submersion are for immersion in a semi-infinite cloud of uniform concentration and apply to each radionuclide separately.

(8) The ALI and DAC values include contributions to exposure by the single radionuclide named and any in-growth of daughter radionuclides produced in the body by decay of the parent. However, intakes that include both the parent and daughter radionuclides shall be treated by the general method appropriate for mixtures.

(9) The values of ALI and DAC do not apply directly when the individual both ingests and inhales a radionuclide, when the individual is exposed to a mixture of radionuclides by either inhalation or ingestion or both, or when the individual is exposed to both internal and external irradiation (see §336.306 of this title (relating to Compliance with Requirements for Summation of External and Internal Doses)). When an individual is exposed to radioactive materials which fall under several of the translocation classifications of the same radionuclide (i.e., Class D, Class W, or Class Y), the exposure may be evaluated as if it were a mixture of different radionuclides.

(10) It shall be noted that the classification of a compound as Class D, W, or Y is based on the chemical form of the compound and does not take into account the radiological half-life of different radionuclides. For this reason, values are given for Class D, W, and Y compounds, even for very short-lived radionuclides.

(c) Table II, "Effluent Concentrations". The columns in Table II of this appendix captioned "Effluent Concentrations," "Air," and "Water" are applicable to the assessment and control of dose to the public, particularly in the implementation of the provisions of §336.314 of this title (relating to Compliance with Dose Limits for Individual Members of the Public). The concentration values given in Columns 1 and 2 of Table II are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent of 0.05 rem (0.5 millisievert).

(1) Consideration of non-stochastic limits has not been included in deriving the air and water effluent concentration limits because non-stochastic effects are presumed not to occur at or below the dose levels established for individual members of the public. For radionuclides, where the non-stochastic limit was governing in deriving the occupational DAC, the stochastic ALI was used in deriving the corresponding airborne effluent limit in Table II. For this reason, the DAC and airborne effluent limits are not always proportional.

(2) The air concentration values listed in Table II, Column 1, were derived by one of two methods. For those radionuclides for which the stochastic limit is governing, the occupational stochastic inhalation ALI was divided by 2.4×10^9 ml, relating the inhalation ALI to the DAC and then divided by a factor of 300. The factor of 300 is composed of a factor of 50 to relate the 5-rem (0.05 sievert) annual occupational dose limit to the 0.1 rem (1 millisievert) limit for members of the public, a factor of 3 to adjust for the difference in exposure time and the inhalation rate for a worker and that for members of the public; and a factor of 2 to adjust the occupational values (derived for adults) so that they are applicable to other age groups.

(3) For those radionuclides for which submersion (external dose) is limiting, the occupational DAC in Table I, Column 3, was divided by 219. The factor of 219 is composed of a factor of

50 and a factor of 4.38 relating occupational exposure for 2,000 hours/year to full-time exposure (8,760 hours/year). Note that an additional factor of 2 for age considerations is not warranted in the submersion case.

(4) The water concentrations were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3×10^7 ml. The factor of 7.3×10^7 ml is composed of the factors of 50 and 2 and a factor of 7.3×10^5 ml which is the annual water intake of "reference man."

(5) Note 6 of this appendix provides groupings of radionuclides that are applicable to unknown mixtures of radionuclides. These groupings, including occupational inhalation ALIs and DACs, air and water effluent concentrations, and releases to sewerage, require demonstrating that the most limiting radionuclides in successive classes are absent. The limit for the unknown mixture is defined when the presence of one of the listed radionuclides cannot be definitely excluded either from knowledge of the radionuclide composition of the source or from actual measurements.

(d) Table III, "releases to sewers". The monthly average concentrations for release to sanitary sewerage are applicable to the provisions in §336.333 of this title (relating to Disposal by Release into Sanitary Sewerage). The concentration values were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3×10^6 ml. The factor of 7.3×10^6 ml is composed of a factor of 7.3×10^5 ml, the annual water intake by "reference man," and a factor of 10, such that the concentrations, if the sewage released by the licensee were the only source of water ingested by a "reference man" during a year, would result in a committed effective dose equivalent of 0.5 rem (5 millisieverts).

List of Elements

Name	Symbol	Atomic Number	Name	Symbol	Atomic Number
Actinium	Ac	89	Indium	In	49
Aluminum	Al	13	Iodine	I	53
Americium	Am	95	Iridium	Ir	77
Antimony	Sb	51	Iron	Fe	26
Argon	Ar	18	Krypton	Kr	36
Arsenic	As	33	Lanthanum	La	57
Astatine	At	85	Lead	Pb	82
Barium	Ba	56	Lutetium	Lu	71
Berkelium	Bk	97	Magnesium	Mg	12
Beryllium	Be	4	Manganese	Mn	25
Bismuth	Bi	83	Mendelevium	Md	101
Bromine	Br	35	Mercury	Hg	80
Cadmium	Cd	48	Molybdenum	Mo	42
Calcium	Ca	20	Neodymium	Nd	60
Californium	Cf	98	Neptunium	Np	93
Carbon	C	6	Nickel	Ni	28
Cerium	Ce	58	Niobium	Nb	41
Cesium	Cs	55	Osmium	Os	76
Chlorine	Cl	17	Palladium	Pd	46
Chromium	Cr	24	Phosphorous	P	15
Cobalt	Co	27	Platinum	Pt	78
Copper	Cu	29	Plutonium	Pu	94
Curium	Cm	96	Polonium	Po	84
Dysprosium	Dy	66	Potassium	K	19
Einsteinium	Es	99	Praseodymium	Pr	59
Erbium	Er	68	Promethium	Pm	61
Europium	Eu	63	Protactinium	Pa	91
Fermium	Fm	100	Radium	Ra	88
Fluorine	F	9	Radon	Rn	86
Francium	Fr	87	Rhenium	Re	75
Gadolinium	Gd	64	Rhodium	Rh	45
Gallium	Ga	31	Rubidium	Rb	37
Germanium	Ge	32	Ruthenium	Ru	44
Gold	Au	79	Samarium	Sm	62
Hafnium	Hf	72	Scandium	Sc	21
Holmium	Ho	67	Selenium	Se	34
Hydrogen	H	1	Silicon	Si	14

Name	Symbol	Atomic Number
Silver	Ag	47
Sodium	Na	11
Strontium	Sr	38
Sulfur	S	16
Tantalum	Ta	73
Technetium	Tc	43
Tellurium	Te	52
Terbium	Tb	65
Thallium	Tl	81
Thorium	Th	90
Thulium	Tm	69
Tin	Sn	50
Titanium	Ti	22
Tungsten	W	74
Uranium	U	92
Vanadium	V	23
Xenon	Xe	54
Ytterbium	Yb	70
Yttrium	Y	39
Zinc	Zn	30
Zirconium	Zr	40

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 3 Inhalation ALI (µCi/ml)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Conc. Col. 1 Air (µCi/ml)	Table II Effluent Conc. Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly
1	Hydrogen-3	Water, DAC includes skin absorption	8E+4	8E+4	2E-5	1E-7	1E-3	1E-2	
		Gas (HT or T_2) Submersion[1]: Use above values as HT and T_2 oxidize in air and in the body to HTO.							
4	Beryllium-7	W, all compounds except those given for Y	4E+4	2E+4	9E-6	3E-8	6E-4	6E-3	
		Y, oxides, halides, and nitrates	-	2E+4	8E-6	3E-8	-	-	
4	Beryllium-10	W, see ^{7}Be	1E+3	2E+2	6E-8	2E-10	-	-	
			LLI wall (1E+3)	-	-	-	2E-5	2E-4	
		Y, see ^{7}Be	-	1E+1	6E-9	2E-11	-	-	
6	Carbon-11[2]	Monoxide	-	1E+6	5E-4	2E-6	-	-	
		Dioxide	-	6E+5	3E-4	9E-7	-	-	
		Compounds	4E+5	4E+5	2E-4	6E-7	6E-3	6E-2	
6	Carbon-14	Monoxide	-	2E+6	7E-4	2E-6	-	-	
		Dioxide	-	2E+5	9E-5	3E-7	-	-	
		Compounds	2E+3	2E+3	1E-6	3E-9	3E-5	3E-4	
9	Fluorine-18[2]	D, fluorides of H, Li, Na, K, Rb, Cs, and Fr	5E+4	7E+4	3E-5	1E-7	-	-	
			St wall (5E+4)	-	-	-	7E-4	7E-3	
		W, fluorides of Be, Mg, Ca, Sr, Ba, Ra, Al, Ga, In, Tl, As, Sb, Bi, Fe, Ru, Os, Co, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, Sc, Y, Ti, Zr, V, Nb, Ta, Mn, Tc, and Re	-	9E+4	4E-5	1E-7	-	-	
		Y, lanthanum fluoride	-	8E+4	3E-5	1E-7	-	-	
11	Sodium-22	D, all compounds	4E+2	6E+2	3E-7	9E-10	6E-6	6E-5	
11	Sodium-24	D, all compounds	4E+3	5E+3	2E-6	7E-9	5E-5	5E-4	
12	Magnesium-28	D, all compounds except those given for W	7E+2	2E+3	7E-7	2E-9	9E-6	9E-5	
		W, oxides, hydroxides, carbides, halides, and nitrates	-	1E+3	5E-7	2E-9	-	-	
13	Aluminum-26	D, all compounds except							

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			(µCi)	ALI (µCi)	ALI (µCi/ml)	DAC	Air (µCi/ml)	Water
		those given for W	4E+2	6E+1	3E-8	9E-11	6E-6	6E-5
		W, oxides, hydroxides, carbides, halides, and nitrates	-	9E+1	4E-8	1E-10	-	-
14	Silicon-31	D, all compounds except those given for W and Y		9E+3	3E+4	1E-5	4E-8	1E-4
	1E-3							
		W, oxides, hydroxides, carbides, and nitrates	-	3E+4	1E-5	5E-8	-	-
		Y, aluminosilicate glass	-	3E+4	1E-5	4E-8	-	-
14	Silicon-32	D, see ^{31}Si	2E+3	2E+2	1E-7	3E-10	-	-
			LLI wall (3E+3)	-	-	-	4E-5	4E-4
		W, see ^{31}Si	-	1E+2	5E-8	2E-10	-	-
		Y, see ^{31}Si	-	5E+0	2E-9	7E-12	-	-
15	Phosphorus-32	D, all compounds except phosphates given for W	6E+2	9E+2	4E-7	1E-9	9E-6	9E-5
		W, phosphates of Zn^{2+}, S^{3+}, Mg^{2+}, Fe^{3+}, Bi^{3+}, and lanthanides	-	4E+2	2E-7	5E-10	-	-
15	Phosphorus-33	D, see ^{32}P	6E+3	8E+3	4E-6	1E-8	8E-5	8E-4
		W, see ^{32}P	-	3E+3	1E-6	4E-9	-	-
16	Sulfur-35	Vapor		1E+4	6E-6	2E-8	-	-
		D, sulfides and sulfates except those given for W		1E+4	2E+4	7E-6	2E-8	-
	-							
			LLI wall (8E+3)	-	-	-	1E-4	1E-3
		W, elemental sulfur, sulfides of Sr, Ba, Ge, Sn, Pb, As, Sb, Bi, Cu, Ag, Au, Zn, Cd, Hg, W, and Mo, and sulfates of Ca, Sr, Ba, Ra, As, Sb, and Bi	6E+3	2E+3	9E-7	3E-9	-	-
17	Chlorine-36	D, chlorides of H, Li, Na, K, Rb, Cs, and Fr	2E+3	2E+3	1E-6	3E-9	2E-5	2E-4
		W, chlorides of lanthanides, Be, Mg, Ca, Sr, Ba, Ra, Al, Ga, In, Tl, Ge, Sn, Pb, As, Sb, Bi, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, Sc, Y, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Tc, and Re	-	2E+2	1E-7	3E-10	-	-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion		Inhalation			Monthly
			ALI		ALI	DAC	Air Water	
			(μCi)	(μCi)	(μCi/ml)		(μCi/ml)	
17	Chlorine-38[2]	D, see ^{36}Cl	2E+4	4E+4	2E-5	6E-8	-	-
			St wall (3E+4)	-	-	-	3E-4	3E-3
		W, see ^{36}Cl	-	5E+4	2E-5	6E-8	-	-
17	Chlorine-39[2]	D, see ^{36}Cl	2E+4	5E+4	2E-5	7E-8	-	-
			St wall (4E+4)	-	-	-	5E-4	5E-3
		W, see ^{36}Cl	-	6E+4	2E-5	8E-8	-	-
18	Argon-37	Submersion[1]	-	-	1E+0	6E-3	-	-
18	Argon-39	Submersion[1]	-	-	2E-4	8E-7	-	-
18	Argon-41	Submersion[1]	-	-	3E-6	1E-8	-	-
19	Potassium-40	D, all compounds	3E+2	4E+2	2E-7	6E-10	4E-6	4E-5
19	Potassium-42	D, all compounds	5E+3	5E+3	2E-6	7E-9	6E-5	6E-4
19	Potassium-43	D, all compounds	6E+3	9E+3	4E-6	1E-8	9E-5	9E-4
19	Potassium-44[2]	D, all compounds	2E+4	7E+4	3E-5	9E-8	-	-
			St wall (4E+4)	-	-	-	5E-4	5E-3
19	Potassium-45[2]	D, all compounds	3E+4	1E+5	5E-5	2E-7	-	-
			St wall (5E+4)	-	-	-	7E-4	7E-3
20	Calcium-41	W, all compounds	3E+3	4E+3	2E-6	-	-	-
			Bone surf (4E+3)	(4E+3)	Bone surf -	5E-9	6E-5	6E-4
20	Calcium-45	W, all compounds	2E+3	8E+2	4E-7	1E-9	2E-5	2E-4
20	Calcium-47	W, all compounds	8E+2	9E+2	4E-7	1E-9	1E-5	1E-4
21	Scandium-43	Y, all compounds	7E+3	2E+4	9E-6	3E-8	1E-4	1E-3
21	Scandium-44m	Y, all compounds	5E+2	7E+2	3E-7	1E-9	7E-6	7E-5
21	Scandium-44	Y, all compounds	4E+3	1E+4	5E-6	2E-8	5E-5	5E-4
21	Scandium-46	Y, all compounds	9E+2	2E+2	1E-7	3E-10	1E-5	1E-4
21	Scandium-47	Y, all compounds	2E+3	3E+3	1E-6	4E-9	-	-
			LLI wall (3E+3)	-	-	-	4E-5	4E-4

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI (μCi)	ALI (μCi/ml)	DAC (μCi/ml)	Air	Water	
21	Scandium-48	Y, all compounds	8E+2	1E+3	6E-7	2E-9	1E-5	1E-4
21	Scandium-49[2]	Y, all compounds	2E+4	5E+4	2E-5	8E-8	3E-4	3E-3
22	Titanium-44	D, all compounds except those given for W and Y		3E+2	1E+1	5E-9	2E-11	4E-6
	4E-5	W, oxides, hydroxides, carbides, halides, and nitrates	-	3E+1	1E-8	4E-11	-	-
		Y, $SrTi0_3$	-	6E+0	2E-9	8E-12	-	-
22	Titanium-45	D, see ^{44}Ti	9E+3	3E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{44}Ti	-	4E+4	1E-5	5E-8	-	-
		Y, see ^{44}Ti	-	3E+4	1E-5	4E-8	-	-
23	Vanadium-47[2]	D, all compounds except those given for W	3E+4	8E+4	3E-5	1E-7	-	-
			St wall (3E+4)	-	-	-	4E-4	4E-3
		W, oxides, hydroxides, carbides, and halides	-	1E+5	4E-5	1E-7	-	-
23	Vanadium-48	D, see ^{47}V	6E+2	1E+3	5E-7	2E-9	9E-6	9E-5
		W, see ^{47}V	-	6E+2	3E-7	9E-10	-	-
23	Vanadium-49	D, see ^{47}V	7E+4	3E+4	1E-5	-	-	-
			LLI wall (9E+4)	(3E+4)	Bone surf -	5E-8	1E-3	1E-2
		W, see ^{47}V	-	2E+4	8E-6	2E-8	-	-
24	Chromium-48	D, all compounds except those given for W and Y		6E+3	1E+4	5E-6	2E-8	8E-5
	8E-4	W, halides and nitrates	-	7E+3	3E-6	1E-8	-	-
		Y, oxides and hydroxides	-	7E+3	3E-6	1E-8	-	-
24	Chromium-49[2]	D, see ^{48}Cr	3E+4	8E+4	4E-5	1E-7	4E-4	4E-3
		W, see ^{48}Cr	-	1E+5	4E-5	1E-7	-	-
		Y, see ^{48}Cr	-	9E+4	4E-5	1E-7	-	-
24	Chromium-51	D, see ^{48}Cr	4E+4	5E+4	2E-5	6E-8	5E-4	5E-3
		W, see ^{48}Cr	-	2E+4	1E-5	3E-8	-	-
		Y, see ^{48}Cr	-	2E+4	8E-6	3E-8	-	-
25	Manganese-51[2]	D, all compounds except those given for W	2E+4	5E+4	2E-5	7E-8	3E-4	3E-3
		W, oxides, hydroxides, halides, and nitrates	-	6E+4	3E-5	8E-8	-	-
25	Manganese-52m[2]	D, see ^{51}Mn	3E+4 St wall	9E+4	4E-5	1E-7	-	-

Atomic No.	Radionuclide	Average Conc. Class (μCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (μCi)	Col. 2 ALI (μCi)	Col. 3 Inhalation ALI (μCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (μCi/ml)	Water (μCi/ml)	Table III Releases to Sewers Monthly
			(4E+4)	-	-	-	5E-4		5E-3
		W, see ^{51}Mn	-	1E+5	4E-5	1E-7	-		-
25	Manganese-52	D, see ^{51}Mn	7E+2	1E+3	5E-7	2E-9	1E-5		1E-4
		W, see ^{51}Mn	-	9E+2	4E-7	1E-9	-		-
25	Manganese-53	D, see ^{51}Mn	5E+4	1E+4	5E-6	-	7E-4		7E-3
			-	Bone surf (2E+4)	-	3E-8	-		-
		W, see ^{51}Mn	-	1E+4	5E-6	2E-8	-		-
25	Manganese-54	D, see ^{51}Mn	2E+3	9E+2	4E-7	1E-9	3E-5		3E-4
		W, see ^{51}Mn	-	8E+2	3E-7	1E-9	-		-
25	Manganese-56	D, see ^{51}Mn	5E+3	2E+4	6E-6	2E-8	7E-5		7E-4
		W, see ^{51}Mn	-	2E+4	9E-6	3E-8	-		-
26	Iron-52	D, all compounds except those given for W	9E+2	3E+3	1E-6	4E-9	1E-5		1E-4
		W, oxides, hydroxides, and halides	-	2E+3	1E-6	3E-9	-		-
26	Iron-55	D, see ^{52}Fe	9E+3	2E+3	8E-7	3E-9	1E-4		1E-3
		W, see ^{52}Fe	-	4E+3	2E-6	6E-9	-		-
26	Iron-59	D, see ^{52}Fe	8E+2	3E+2	1E-7	5E-10	1E-5		1E-4
		W, see ^{52}Fe	-	5E+2	2E-7	7E-10	-		-
26	Iron-60	D, see ^{52}Fe	3E+1	6E+0	3E-9	9E-12	4E-7		4E-6
		W, see ^{52}Fe	-	2E+1	8E-9	3E-11	-		-
27	Cobalt-55	W, all compounds except those given for Y	1E+3	3E+3	1E-6	4E-9	2E-5		2E-4
		Y, oxides, hydroxides, halides, and nitrates	-	3E+3	1E-6	4E-9	-		-
27	Cobalt-56	W, see ^{55}Co	5E+2	3E+2	1E-7	4E-10	6E-6		6E-5
		Y, see ^{55}Co	4E+2	2E+2	8E-8	3E-10	-		-
27	Cobalt-57	W, see ^{55}Co	8E+3	3E+3	1E-6	4E-9	6E-5		6E-4
		Y, see ^{55}Co	4E+3	7E+2	3E-7	9E-10	-		-
27	Cobalt-58m	W, see ^{55}Co	6E+4	9E+4	4E-5	1E-7	8E-4		8E-3
		Y, see ^{55}Co	-	6E+4	3E-5	9E-8	-		-
27	Cobalt-58	W, see ^{55}Co	2E+3	1E+3	5E-7	2E-9	2E-5		2E-4
		Y, see ^{55}Co	1E+3	7E+2	3E-7	1E-9	-		-
27	Cobalt-60m[2]	W, see ^{55}Co	1E+6 St wall	4E+6	2E-3	6E-6	-		-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI	ALI	DAC	Air	Water	
			(μCi)	(μCi)	(μCi/ml)		(μCi/ml)	
			(1E+6)	-	-	-	2E-2	2E-1
		Y, see ^{55}Co	-	3E+6	1E-3	4E-6	-	-
27	Cobalt-60	W, see ^{55}Co	5E+2	2E+2	7E-8	2E-10	3E-6	3E-5
		Y, see ^{55}Co	2E+2	3E+1	1E-8	5E-11	-	-
27	Cobalt-61[2]	W, see ^{55}Co	2E+4	6E+4	3E-5	9E-8	3E-4	3E-3
		Y, see ^{55}Co	2E+4	6E+4	2E-5	8E-8	-	-
27	Cobalt-62m[2]	W, see ^{55}Co	4E+4	2E+5	7E-5	2E-7	-	-
			St wall (5E+4)	-	-	-	7E-4	7E-3
		Y, see ^{55}Co	-	2E+5	6E-5	2E-7	-	-
28	Nickel-56	D, all compounds except those given for W	1E+3	2E+3	8E-7	3E-9	2E-5	2E-4
		W, oxides, hydroxides, and carbides	-	1E+3	5E-7	2E-9	-	-
		Vapor	-	1E+3	5E-7	2E-9	-	-
28	Nickel-57	D, see ^{56}Ni	2E+3	5E+3	2E-6	7E-9	2E-5	2E-4
		W, see ^{56}Ni	-	3E+3	1E-6	4E-9	-	-
		Vapor	-	6E+3	3E-6	9E-9	-	-
28	Nickel-59	D, see ^{56}Ni	2E+4	4E+3	2E-6	5E-9	3E-4	3E-3
		W, see ^{56}Ni	-	7E+3	3E-6	1E-8	-	-
		Vapor	-	2E+3	8E-7	3E-9	-	-
28	Nickel-63	D, see ^{56}Ni	9E+3	2E+3	7E-7	2E-9	1E-4	1E-3
		W, see ^{56}Ni	-	3E+3	1E-6	4E-9	-	-
		Vapor	-	8E+2	3E-7	1E-9	-	-
28	Nickel-65	D, see ^{56}Ni	8E+3	2E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{56}Ni	-	3E+4	1E-5	4E-8	-	-
		Vapor	-	2E+4	7E-6	2E-8	-	-
28	Nickel-66	D, see ^{56}Ni	4E+2	2E+3	7E-7	2E-9	-	-
			LLI wall (5E+2)	-	-	-	6E-6	6E-5
		W, see ^{56}Ni	-	6E+2	3E-7	9E-10	-	-
		Vapor	-	3E+3	1E-6	4E-9	-	-
29	Copper-60[2]	D, all compounds except those given for W and Y		3E+4	9E+4	4E-5	1E-7	-
	-		St wall (3E+4)	-	-	-	4E-4	4E-3
		W, sulfides, halides, and nitrates	-	1E+5	5E-5	2E-7	-	-
		Y, oxides and hydroxides	-	1E+5	4E-5	1E-7	-	-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI	ALI	DAC	Air	Water	
			(μCi)	(μCi)	(μCi/ml)	(μCi/ml)		
29	Copper-61	D, see ^{60}Cu	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3
		W, see ^{60}Cu	-	4E+4	2E-5	6E-8	-	-
		Y, see ^{60}Cu	-	4E+4	1E-5	5E-8	-	-
29	Copper-64	D, see ^{60}Cu	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3
		W, see ^{60}Cu	-	2E+4	1E-5	3E-8	-	-
		Y, see ^{60}Cu	-	2E+4	9E-6	3E-8	-	-
29	Copper-67	D, see ^{60}Cu	5E+3	8E+3	3E-6	1E-8	6E-5	6E-4
		W, see ^{60}Cu	-	5E+3	2E-6	7E-9	-	-
		Y, see ^{60}Cu	-	5E+3	2E-6	6E-9	-	-
30	Zinc-62	Y, all compounds	1E+3	3E+3	1E-6	4E-9	2E-5	2E-4
30	Zinc-63[2]	Y, all compounds	2E+4	7E+4	3E-5	9E-8	-	-
			St wall (3E+4)	-	-	-	3E-4	3E-3
30	Zinc-65	Y, all compounds	4E+2	3E+2	1E-7	4E-10	5E-6	5E-5
30	Zinc-69m	Y, all compounds	4E+3	7E+3	3E-6	1E-8	6E-5	6E-4
30	Zinc-69[2]	Y, all compounds	6E+4	1E+5	6E-5	2E-7	8E-4	8E-3
30	Zinc-71m	Y, all compounds	6E+3	2E+4	7E-6	2E-8	8E-5	8E-4
30	Zinc-72	Y, all compounds	1E+3	1E+3	5E-7	2E-9	1E-5	1E-4
31	Gallium-65[2]	D, all compounds except those given for W	5E+4	2E+5	7E-5	2E-7	-	-
			St wall (6E+4)	-	-	-	9E-4	9E-3
		W, oxides, hydroxides, carbides, halides, and nitrates	-	2E+5	8E-5	3E-7	-	-
31	Gallium-66	D, see ^{65}Ga	1E+3	4E+3	1E-6	5E-9	1E-5	1E-4
		W, see ^{65}Ga	-	3E+3	1E-6	4E-9	-	-
31	Gallium-67	D, see ^{65}Ga	7E+3	1E+4	6E-6	2E-8	1E-4	1E-3
		W, see ^{65}Ga	-	1E+4	4E-6	1E-8	-	-
31	Gallium-68[2]	D, see ^{65}Ga	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{65}Ga	-	5E+4	2E-5	7E-8	-	-
31	Gallium-70[2]	D, see ^{65}Ga	5E+4	2E+5	7E-5	2E-7	-	-
			St wall (7E+4)	-	-	-	1E-3	1E-2
		W, see ^{65}Ga	-	2E+5	8E-5	3E-7	-	-

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI	ALI	DAC	Air	Water	
			(µCi)	(µCi)	(µCi/ml)	(µCi/ml)		
31	Gallium-72	D, see ^{65}Ga	1E+3	4E+3	1E-6	5E-9	2E-5	2E-4
		W, see ^{65}Ga	-	3E+3	1E-6	4E-9	-	-
31	Gallium-73	D, see ^{65}Ga	5E+3	2E+4	6E-6	2E-8	7E-5	7E-4
		W, see ^{65}Ga	-	2E+4	6E-6	2E-8	-	-
32	Germanium-66	D, all compounds except those given for W	2E+4	3E+4	1E-5	4E-8	3E-4	3E-3
		W, oxides, sulfides, and halides	-	2E+4	8E-6	3E-8	-	-
32	Germanium-67[2]	D, see ^{66}Ge	3E+4	9E+4	4E-5	1E-7	-	-
			St wall (4E+4)	-	-	-	6E-4	6E-3
		W, see ^{66}Ge	-	1E+5	4E-5	1E-7	-	-
32	Germanium-68	D, see ^{66}Ge	5E+3	4E+3	2E-6	5E-9	6E-5	6E-4
		W, see ^{66}Ge	-	1E+2	4E-8	1E-10	-	-
32	Germanium-69	D, see ^{66}Ge	1E+4	2E+4	6E-6	2E-8	2E-4	2E-3
		W, see ^{66}Ge	-	8E+3	3E-6	1E-8	-	-
32	Germanium-71	D, see ^{66}Ge	5E+5	4E+5	2E-4	6E-7	7E-3	7E-2
		W, see ^{66}Ge	-	4E+4	2E-5	6E-8	-	-
32	Germanium-75[2]	D, see ^{66}Ge	4E+4	8E+4	3E-5	1E-7	-	-
			St wall (7E+4)	-	-	-	9E-4	9E-3
		W, see ^{66}Ge	-	8E+4	4E-5	1E-7	-	-
32	Germanium-77	D, see ^{66}Ge	9E+3	1E+4	4E-6	1E-8	1E-4	1E-3
		W, see ^{66}Ge	-	6E+3	2E-6	8E-9	-	-
32	Germanium-78[2]	D, see ^{66}Ge	2E+4	2E+4	9E-6	3E-8	-	-
			St wall (2E+4)	-	-	-	3E-4	3E-3
		W, see ^{66}Ge	-	2E+4	9E-6	3E-8	-	-
33	Arsenic-69[2]	W, all compounds	3E+4	1E+5	5E-5	2E-7	-	-
			St wall (4E+4)	-	-	-	6E-4	6E-3
33	Arsenic-70[2]	W, all compounds	1E+4	5E+4	2E-5	7E-8	2E-4	2E-3
33	Arsenic-71	W, all compounds	4E+3	5E+3	2E-6	6E-9	5E-5	5E-4
33	Arsenic-72	W, all compounds	9E+2	1E+3	6E-7	2E-9	1E-5	1E-4
33	Arsenic-73	W, all compounds	8E+3	2E+3	7E-7	2E-9	1E-4	1E-3

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			(μCi)	ALI (μCi)	ALI (μCi/ml)	DAC	Air (μCi/ml)	Water
33	Arsenic-74	W, all compounds	1E+3	8E+2	3E-7	1E-9	2E-5	2E-4
33	Arsenic-76	W, all compounds	1E+3	1E+3	6E-7	2E-9	1E-5	1E-4
33	Arsenic-77	W, all compounds	4E+3	5E+3	2E-6	7E-9	-	-
			LLI wall (5E+3)	-	-	-	6E-5	6E-4
33	Arsenic-78[2]	W, all compounds	8E+3	2E+4	9E-6	3E-8	1E-4	1E-3
34	Selenium-70[2]	D, all compounds except those given for W	2E+4	4E+4	2E-5	5E-8	1E-4	1E-3
		W, oxides, hydroxides, carbides, and elemental Se	1E+4	4E+4	2E-5	6E-8	-	-
34	Selenium-73m[2]	D, see ^{70}Se	6E+4	2E+5	6E-5	2E-7	4E-4	4E-3
		W, see ^{70}Se	3E+4	1E+5	6E-5	2E-7	-	-
34	Selenium-73	D, see ^{70}Se	3E+3	1E+4	5E-6	2E-8	4E-5	4E-4
		W, see ^{70}Se	-	2E+4	7E-6	2E-8	-	-
34	Selenium-75	D, see ^{70}Se	5E+2	7E+2	3E-7	1E-9	7E-6	7E-5
		W, see ^{70}Se	-	6E+2	3E-7	8E-10	-	-
34	Selenium-79	D, see ^{70}Se	6E+2	8E+2	3E-7	1E-9	8E-6	8E-5
		W, see ^{70}Se	-	6E+2	2E-7	8E-10	-	-
34	Selenium-81m[2]	D, see ^{70}Se	4E+4	7E+4	3E-5	9E-8	3E-4	3E-3
		W, see ^{70}Se	2E+4	7E+4	3E-5	1E-7	-	-
34	Selenium-81[2]	D, see ^{70}Se	6E+4	2E+5	9E-5	3E-7	-	-
			St wall (8E+4)	-	-	-	1E-3	1E-2
		W, see ^{70}Se	-	2E+5	1E-4	3E-7	-	-
34	Selenium-83[2]	D, see ^{70}Se	4E+4	1E+5	5E-5	2E-7	4E-4	4E-3
		W, see ^{70}Se	3E+4	1E+5	5E-5	2E-7	-	-
35	Bromine-74m[2]	D, bromides of H, Li, Na, K, Rb, Cs, and Fr	1E+4	4E+4	2E-5	5E-8	-	-
			St wall (2E+4)	-	-	-	3E-4	3E-3
		W, bromides of lantha-nides, Be, Mg, Ca, Sr, Ba, Ra, Al, Ga, In, Tl, Ge, Sn, Pb, As, Sb, Bi, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, Sc, Y, Ti,						

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Col. 2 ALI (µCi)	Col. 3 Inhalation ALI (µCi/ml)	Inhalation DAC	Table II Effluent Conc. Col. 1 Air (µCi/ml)	Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly
		Zr, Hf, V, Nb, Ta, Mn, Tc, and Re	-	4E+4	2E-5	6E-8	-	-	
35	Bromine-74[2]	D, see ^{74m}Br	2E+4	7E+4	3E-5	1E-7	-	-	
			St wall (4E+4)	-	-	-	5E-4	5E-3	
		W, see ^{74m}Br	-	8E+4	4E-5	1E-7	-	-	
35	Bromine-75[2]	D, see ^{74m}Br	3E+4	5E+4	2E-5	7E-8	-	-	
			St wall (4E+4)	-	-	-	5E-4	5E-3	
		W, see ^{74m}Br	-	5E+4	2E-5	7E-8	-	-	
35	Bromine-76	D, see ^{74m}Br	4E+3	5E+3	2E-6	7E-9	5E-5	5E-4	
		W, see ^{74m}Br	-	4E+3	2E-6	6E-9	-	-	
35	Bromine-77	D, see ^{74m}Br	2E+4	2E+4	1E-5	3E-8	2E-4	2E-3	
		W, see ^{74m}Br	-	2E+4	8E-6	3E-8	-	-	
35	Bromine-80m	D, see ^{74m}Br	2E+4	2E+4	7E-6	2E-8	3E-4	3E-3	
		W, see ^{74m}Br	-	1E+4	6E-6	2E-8	-	-	
35	Bromine-80[2]	D, see ^{74m}Br	5E+4	2E+5	8E-5	3E-7	-	-	
			St wall (9E+4)	-	-	-	1E-3	1E-2	
		W, see ^{74m}Br	-	2E+5	9E-5	3E-7	-	-	
35	Bromine-82	D, see ^{74m}Br	3E+3	4E+3	2E-6	6E-9	4E-5	4E-4	
		W, see ^{74m}Br	-	4E+3	2E-6	5E-9	-	-	
35	Bromine-83	D, see ^{74m}Br	5E+4	6E+4	3E-5	9E-8	-	-	
			St wall (7E+4)	-	-	-	9E-4	9E-3	
		W, see ^{74m}Br	-	6E+4	3E-5	9E-8	-	-	
35	Bromine-84[2]	D, see ^{74m}Br	2E+4	6E+4	2E-5	8E-8	-	-	
			St wall (3E+4)	-	-	-	4E-4	4E-3	
		W, see ^{74m}Br	-	6E+4	3E-5	9E-8	-	-	
36	Krypton-74[2]	Submersion[1]	-	-	3E-6	1E-8	-	-	
36	Krypton-76	Submersion[1]	-	-	9E-6	4E-8	-	-	
36	Krypton-77[2]	Submersion[1]	-	-	4E-6	2E-8	-	-	
36	Krypton-79	Submersion[1]	-	-	2E-5	7E-8	-	-	
36	Krypton-81	Submersion[1]	-	-	7E-4	3E-6	-	-	

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion ALI (μCi)	Col. 2 ALI (μCi)	Col. 3 Inhalation ALI (μCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (μCi/ml)	Water (μCi/ml)	Table III Releases to Sewers Monthly
36	Krypton-83m[2]	Submersion[1]	-	-	1E-2	5E-5	-		-
36	Krypton-85m	Submersion[1]	-	-	2E-5	1E-7	-		-
36	Krypton-85	Submersion[1]	-	-	1E-4	7E-7	-		-
36	Krypton-87[2]	Submersion[1]	-	-	5E-6	2E-8	-		-
36	Krypton-88	Submersion[1]	-	-	2E-6	9E-9	-		-
37	Rubidium-79[2]	D, all compounds	4E+4	1E+5	5E-5	2E-7	-		-
			St wall (6E+4)	-	-	-	8E-4		8E-3
37	Rubidium-81m[2]	D, all compounds	2E+5	3E+5	1E-4	5E-7	-		-
			St wall (3E+5)	-	-	-	4E-3		4E-2
37	Rubidium-81	D, all compounds	4E+4	5E+4	2E-5	7E-8	5E-4		5E-3
37	Rubidium-82m	D, all compounds	1E+4	2E+4	7E-6	2E-8	2E-4		2E-3
37	Rubidium-83	D, all compounds	6E+2	1E+3	4E-7	1E-9	9E-6		9E-5
37	Rubidium-84	D, all compounds	5E+2	8E+2	3E-7	1E-9	7E-6		7E-5
37	Rubidium-86	D, all compounds	5E+2	8E+2	3E-7	1E-9	7E-6		7E-5
37	Rubidium-87	D, all compounds	1E+3	2E+3	6E-7	2E-9	1E-5		1E-4
37	Rubidium-88[2]	D, all compounds	2E+4	6E+4	3E-5	9E-8	-		-
			St wall (3E+4)	-	-	-	4E-4		4E-3
37	Rubidium-89[2]	D, all compounds	4E+4	1E+5	6E-5	2E-7	-		-
			St wall (6E+4)	-	-	-	9E-4		9E-3
38	Strontium-80[2]	D, all soluble compounds except $SrTiO_3$	4E+3	1E+4	5E-6	2E-8	6E-5		6E-4
		Y, all insoluble compounds and $SrTi0_3$	-	1E+4	5E-6	2E-8	-		-
38	Strontium-81[2]	D, see ^{80}Sr	3E+4	8E+4	3E-5	1E-7	3E-4		3E-3
		Y, see ^{80}Sr	2E+4	8E+4	3E-5	1E-7	-		-
38	Strontium-82	D, see ^{80}Sr	3E+2	4E+2	2E-7	6E-10	-		-
			LLI wall (2E+2)	-	-	-	3E-6		3E-5
		Y, see ^{80}Sr	2E+2	9E+1	4E-8	1E-10	-		-

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI		ALI	DAC	Air	Water
			(µCi)	(µCi)	(µCi/ml)		(µCi/ml)	
38	Strontium-83	D, see ^{80}Sr	3E+3	7E+3	3E-6	1E-8	3E-5	3E-4
		Y, see ^{80}Sr	2E+3	4E+3	1E-6	5E-9	-	-
38	Strontium-85m[2]	D, see ^{80}Sr	2E+5	6E+5	3E-4	9E-7	3E-3	3E-2
		Y, see ^{80}Sr	-	8E+5	4E-4	1E-6	-	-
38	Strontium-85	D, see ^{80}Sr	3E+3	3E+3	1E-6	4E-9	4E-5	4E-4
		Y, see ^{80}Sr	-	2E+3	6E-7	2E-9	-	-
38	Strontium-87m	D, see ^{80}Sr	5E+4	1E+5	5E-5	2E-7	6E-4	6E-3
		Y, see ^{80}Sr	4E+4	2E+5	6E-5	2E-7	-	-
38	Strontium-89	D, see ^{80}Sr	6E+2	8E+2	4E-7	1E-9	-	-
			LLI wall (6E+2)	-	-	-	8E-6	8E-5
		Y, see ^{80}Sr	5E+2	1E+2	6E-8	2E-10	-	-
38	Strontium-90	D, see ^{80}Sr	3E+1	2E+1	8E-9	-	-	-
			Bone surf (4E+1)	(2E+1)	Bone surf -	3E-11	5E-7	5E-6
		Y, see ^{80}Sr	-	4E+0	2E-9	6E-12	-	-
38	Strontium-91	D, see ^{80}Sr	2E+3	6E+3	2E-6	8E-9	2E-5	2E-4
		Y, see ^{80}Sr	-	4E+3	1E-6	5E-9	-	-
38	Strontium-92	D, see ^{80}Sr	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		Y, see ^{80}Sr	-	7E+3	3E-6	9E-9	-	-
39	Yttrium-86m[2]	W, all compounds except those given for Y	2E+4	6E+4	2E-5	8E-8	3E-4	3E-3
		Y, oxides and hydroxides	-	5E+4	2E-5	8E-8	-	-
39	Yttrium-86	W, see ^{86m}Y	1E+3	3E+3	1E-6	5E-9	2E-5	2E-4
		Y, see ^{86m}Y	-	3E+3	1E-6	5E-9	-	-
39	Yttrium-87	W, see ^{86m}Y	2E+3	3E+3	1E-6	5E-9	3E-5	3E-4
		Y, see ^{86m}Y	-	3E+3	1E-6	5E-9	-	-
39	Yttrium-88	W, see ^{86m}Y	1E+3	3E+2	1E-7	3E-10	1E-5	1E-4
		Y, see ^{86m}Y	-	2E+2	1E-7	3E-10	-	-
39	Yttrium-90m	W, see ^{86m}Y	8E+3	1E+4	5E-6	2E-8	1E-4	1E-3
		Y, see ^{86m}Y	-	1E+4	5E-6	2E-8	-	-
39	Yttrium-90	W, see ^{86m}Y	4E+2	7E+2	3E-7	9E-10	-	-
			LLI wall (5E+2)	-	-	-	7E-6	7E-5
		Y, see ^{86m}Y	-	6E+2	3E-7	9E-10	-	-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI	ALI	DAC	Air	Water	
			(μCi)	(μCi)	(μCi/ml)	(μCi/ml)		
39	Yttrium-91m[2]	W, see ^{86m}Y	1E+5	2E+5	1E-4	3E-7	2E-3	2E-2
		Y, see ^{86m}Y	-	2E+5	7E-5	2E-7	-	-
39	Yttrium-91	W, see ^{86m}Y	5E+2	2E+2	7E-8	2E-10	-	-
			LLI wall (6E+2)	-	-	-	8E-6	8E-5
		Y, see ^{86m}Y	-	1E+2	5E-8	2E-10	-	-
39	Yttrium-92	W, see ^{86m}Y	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		Y, see ^{86m}Y	-	8E+3	3E-6	1E-8	-	-
39	Yttrium-93	W, see ^{86m}Y	1E+3	3E+3	1E-6	4E-9	2E-5	2E-4
		Y, see ^{86m}Y	-	2E+3	1E-6	3E-9	-	-
39	Yttrium-94[2]	W, see ^{86m}Y	2E+4	8E+4	3E-5	1E-7	-	-
			St wall (3E+4)	-	-	-	4E-4	4E-3
		Y, see ^{86m}Y	-	8E+4	3E-5	1E-7	-	-
39	Yttrium-95[2]	W, see ^{86m}Y	4E+4	2E+5	6E-5	2E-7	-	-
			St wall (5E+4)	-	-	-	7E-4	7E-3
		Y, see ^{86m}Y	-	1E+5	6E-5	2E-7	-	-
40	Zirconium-86	D, all compounds except those given for W and Y		1E+3	4E+3	2E-6	6E-9	2E-5
	2E-4	W, oxides, hydroxides, halides, and nitrates	-	3E+3	1E-6	4E-9	-	-
		Y, carbide	-	2E+3	1E-6	3E-9	-	-
40	Zirconium-88	D, see ^{86}Zr	4E+3	2E+2	9E-8	3E-10	5E-5	5E-4
		W, see ^{86}Zr	-	5E+2	2E-7	7E-10	-	-
		Y, see ^{86}Zr	-	3E+2	1E-7	4E-10	-	-
40	Zirconium-89	D, see ^{86}Zr	2E+3	4E+3	1E-6	5E-9	2E-5	2E-4
		W, see ^{86}Zr	-	2E+3	1E-6	3E-9	-	-
		Y, see ^{86}Zr	-	2E+3	1E-6	3E-9	-	-
40	Zirconium-93	D, see ^{86}Zr	1E+3	6E+0	3E-9	-	-	-
			Bone surf (3E+3)	(2E+1)	Bone surf -	2E-11	4E-5	4E-4
		W, see ^{86}Zr	-	2E+1	1E-8	-	-	-
			-	Bone surf (6E+1)	-	9E-11	-	-
		Y, see ^{86}Zr	-	6E+1	2E-8	-	-	-
			-	Bone surf (7E+1)	-	9E-11	-	-
40	Zirconium-95	D, see ^{86}Zr	1E+3	1E+2	5E-8	-	2E-5	2E-4

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (µCi)	Col. 2 ALI (µCi)	Col. 3 Inhalation ALI (µCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (µCi/ml)	Water (µCi/ml)	Table III Releases to Sewers Monthly
			-	Bone surf (3E+2)	-	4E-10	-		-
		W, see ^{86}Zr	-	4E+2	2E-7	5E-10	-		-
		Y, see ^{86}Zr	-	3E+2	1E-7	4E-10	-		-
40	Zirconium-97	D, see ^{86}Zr	6E+2	2E+3	8E-7	3E-9	9E-6		9E-5
		W, see ^{86}Zr	-	1E+3	6E-7	2E-9	-		-
		Y, see ^{86}Zr	-	1E+3	5E-7	2E-9	-		-
41	Niobium-88[2]	W, all compounds except those given for Y	5E+4	2E+5	9E-5	3E-7	-		-
				St wall (7E+4)	-	-	-	1E-3	1E-2
		Y, oxides and hydroxides	-	2E+5	9E-5	3E-7	-		-
41	Niobium-89[2] (66 min)	W, see ^{88}Nb	1E+4	4E+4	2E-5	6E-8	1E-4		1E-3
		Y, see ^{88}Nb	-	4E+4	2E-5	5E-8	-		-
41	Niobium-89 (122 min)	W, see ^{88}Nb	5E+3	2E+4	8E-6	3E-8	7E-5		7E-4
		Y, see ^{88}Nb	-	2E+4	6E-6	2E-8	-		-
41	Niobium-90	W, see ^{88}Nb	1E+3	3E+3	1E-6	4E-9	1E-5		1E-4
		Y, see ^{88}Nb	-	2E+3	1E-6	3E-9	-		-
41	Niobium-93m	W, see ^{88}Nb	9E+3	2E+3	8E-7	3E-9	-		-
				LLI wall (1E+4)	-	-	-	2E-4	2E-3
		Y, see ^{88}Nb	-	2E+2	7E-8	2E-10	-		-
41	Niobium-94	W, see ^{88}Nb	9E+2	2E+2	8E-8	3E-10	1E-5		1E-4
		Y, see ^{88}Nb	-	2E+1	6E-9	2E-11	-		-
41	Niobium-95m	W, see ^{88}Nb	2E+3	3E+3	1E-6	4E-9	-		-
				LLI wall (2E+3)	-	-	-	3E-5	3E-4
		Y, see ^{88}Nb	-	2E+3	9E-7	3E-9	-		-
41	Niobium-95	W, see ^{88}Nb	2E+3	1E+3	5E-7	2E-9	3E-5		3E-4
		Y, see ^{88}Nb	-	1E+3	5E-7	2E-9	-		-
41	Niobium-96	W, see ^{88}Nb	1E+3	3E+3	1E-6	4E-9	2E-5		2E-4
		Y, see ^{88}Nb	-	2E+3	1E-6	3E-9	-		-
41	Niobium-97[2]	W, see ^{88}Nb	2E+4	8E+4	3E-5	1E-7	3E-4		3E-3
		Y, see ^{88}Nb	-	7E+4	3E-5	1E-7	-		-
41	Niobium-98[2]	W, see ^{88}Nb	1E+4	5E+4	2E-5	8E-8	2E-4		2E-3
		Y, see ^{88}Nb	-	5E+4	2E-5	7E-8	-		-

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI	ALI	DAC	Air	Water	
			(µCi)	(µCi)	(µCi/ml)	(µCi/ml)		
42	Molybdenum-90	D, all compounds except those given for Y	4E+3	7E+3	3E-6	1E-8	3E-5	3E-4
		Y, oxides, hydroxides, and MoS_2	2E+3	5E+3	2E-6	6E-9	-	-
42	Molybdenum-93m	D, see ^{90}Mo	9E+3	2E+4	7E-6	2E-8	6E-5	6E-4
		Y, see ^{90}Mo	4E+3	1E+4	6E-6	2E-8	-	-
42	Molybdenum-93	D, see ^{90}Mo	4E+3	5E+3	2E-6	8E-9	5E-5	5E-4
		Y, see ^{90}Mo	2E+4	2E+2	8E-8	2E-10	-	-
42	Molybdenum-99	D, see ^{90}Mo	2E+3	3E+3	1E-6	4E-9	-	-
			LLI wall (1E+3)	-	-	-	2E-5	2E-4
		Y, see ^{90}Mo	1E+3	1E+3	6E-7	2E-9	-	-
42	Molybdenum-101[2]	D, see ^{90}Mo	4E+4	1E+5	6E-5	2E-7	-	-
			St wall (5E+4)	-	-	-	7E-4	7E-3
		Y, see ^{90}Mo	-	1E+5	6E-5	2E-7	-	-
43	Technetium-93m[2]	D, all compounds except those given for W	7E+4	2E+5	6E-5	2E-7	1E-3	1E-2
		W, oxides, hydroxides, halides, and nitrates	-	3E+5	1E-4	4E-7	-	-
43	Technetium-93	D, see ^{93m}Tc	3E+4	7E+4	3E-5	1E-7	4E-4	4E-3
		W, see ^{93m}Tc	-	1E+5	4E-5	1E-7	-	-
43	Technetium-94m[2]	D, see ^{93m}Tc	2E+4	4E+4	2E-5	6E-8	3E-4	3E-3
		W, see ^{93m}Tc	-	6E+4	2E-5	8E-8	-	-
43	Technetium-94	D, see ^{93m}Tc	9E+3	2E+4	8E-6	3E-8	1E-4	1E-3
		W, see ^{93m}Tc	-	2E+4	1E-5	3E-8	-	-
43	Technetium-95m	D, see ^{93m}Tc	4E+3	5E+3	2E-6	8E-9	5E-5	5E-4
		W, see ^{93m}Tc	-	2E+3	8E-7	3E-9	-	-
43	Technetium-95	D, see ^{93m}Tc	1E+4	2E+4	9E-6	3E-8	1E-4	1E-3
		W, see ^{93m}Tc	-	2E+4	8E-6	3E-8	-	-
43	Technetium-96m[2]	D, see ^{93m}Tc	2E+5	3E+5	1E-4	4E-7	2E-3	2E-2
		W, see ^{93m}Tc	-	2E+5	1E-4	3E-7	-	-
43	Technetium-96	D, see ^{93m}Tc	2E+3	3E+3	1E-6	5E-9	3E-5	3E-4
		W, see ^{93m}Tc	-	2E+3	9E-7	3E-9	-	-
43	Technetium-97m	D, see ^{93m}Tc	5E+3	7E+3	3E-6	-	6E-5	6E-4
			-	St wall (7E+3)	-	1E-8	-	-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			(μCi)	ALI (μCi)	ALI (μCi/ml)	DAC	Air (μCi/ml)	Water
		W, see ^{93m}Tc	-	1E+3	5E-7	2E-9	-	-
43	Technetium-97	D, see ^{93m}Tc	4E+4	5E+4	2E-5	7E-8	5E-4	5E-3
		W, see ^{93m}Tc	-	6E+3	2E-6	8E-9	-	-
43	Technetium-98	D, see ^{93m}Tc	1E+3	2E+3	7E-7	2E-9	1E-5	1E-4
		W, see ^{93m}Tc	-	3E+2	1E-7	4E-10	-	-
43	Technetium-99m	D, see ^{93m}Tc	8E+4	2E+5	6E-5	2E-7	1E-3	1E-2
		W, see ^{93m}Tc	-	2E+5	1E-4	3E-7	-	-
43	Technetium-99	D, see ^{93m}Tc	4E+3	5E+3 St wall	2E-6	-	6E-5	6E-4
			-	(6E+3)	-	8E-9	-	-
		W, see ^{93m}Tc	-	7E+2	3E-7	9E-10	-	-
43	Technetium-101[2]	D, see ^{93m}Tc	9E+4	3E+5	1E-4	5E-7	-	-
			St wall (1E+5)	-	-	-	2E-3	2E-2
		W, see ^{93m}Tc	-	4E+5	2E-4	5E-7	-	-
43	Technetium-104[2]	D, see ^{93m}Tc	2E+4	7E+4	3E-5	1E-7	-	-
			St wall (3E+4)	-	-	-	4E-4	4E-3
		W, see ^{93m}Tc	-	9E+4	4E-5	1E-7	-	-
44	Ruthenium-94[2] 2E-3	D, all compounds except those given for W and Y		2E+4	4E+4	2E-5	6E-8	2E-4
		W, halides	-	6E+4	3E-5	9E-8	-	-
		Y, oxides and hydroxides	-	6E+4	2E-5	8E-8	-	-
44	Ruthenium-97	D, see ^{94}Ru	8E+3	2E+4	8E-6	3E-8	1E-4	1E-3
		W, see ^{94}Ru	-	1E+4	5E-6	2E-8	-	-
		Y, see ^{94}Ru	-	1E+4	5E-6	2E-8	-	-
44	Ruthenium-103	D, see ^{94}Ru	2E+3	2E+3	7E-7	2E-9	3E-5	3E-4
		W, see ^{94}Ru	-	1E+3	4E-7	1E-9	-	-
		Y, see ^{94}Ru	-	6E+2	3E-7	9E-10	-	-
44	Ruthenium-105	D, see ^{94}Ru	5E+3	1E+4	6E-6	2E-8	7E-5	7E-4
		W, see ^{94}Ru	-	1E+4	6E-6	2E-8	-	-
		Y, see ^{94}Ru	-	1E+4	5E-6	2E-8	-	-
44	Ruthenium-106	D, see ^{94}Ru	2E+2	9E+1	4E-8	1E-10	-	-
			LLI wall (2E+2)	-	-	-	3E-6	3E-5
		W, see ^{94}Ru	-	5E+1	2E-8	8E-11	-	-
		Y, see ^{94}Ru	-	1E+1	5E-9	2E-11	-	-

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (µCi)	Col. 2 Oral Ingestion ALI (µCi)	Col. 3 Inhalation ALI (µCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (µCi/ml)	Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly
45	Rhodium-99m	D, all compounds except those given for W and Y		2E+4	6E+4	2E-5	8E-8		2E-4
\	2E-3	W, halides	-	8E+4	3E-5	1E-7	-		-
		Y, oxides and hydroxides	-	7E+4	3E-5	9E-8	-		-
45	Rhodium-99	D, see ^{99m}Rh	2E+3	3E+3	1E-6	4E-9	3E-5		3E-4
		W, see ^{99m}Rh	-	2E+3	9E-7	3E-9	-		-
		Y, see ^{99m}Rh	-	2E+3	8E-7	3E-9	-		-
45	Rhodium-100	D, see ^{99m}Rh	2E+3	5E+3	2E-6	7E-9	2E-5		2E-4
		W, see ^{99m}Rh	-	4E+3	2E-6	6E-9	-		-
		Y, see ^{99m}Rh	-	4E+3	2E-6	5E-9	-		-
45	Rhodium-101m	D, see ^{99m}Rh	6E+3	1E+4	5E-6	2E-8	8E-5		8E-4
		W, see ^{99m}Rh	-	8E+3	4E-6	1E-8	-		-
		Y, see ^{99m}Rh	-	8E+3	3E-6	1E-8	-		-
45	Rhodium-101	D, see ^{99m}Rh	2E+3	5E+2	2E-7	7E-10	3E-5		3E-4
		W, see ^{99m}Rh	-	8E+2	3E-7	1E-9	-		-
		Y, see ^{99m}Rh	-	2E+2	6E-8	2E-10	-		-
45	Rhodium-102m	D, see ^{99m}Rh	1E+3	5E+2	2E-7	7E-10	-		-
			LLI wall (1E+3)	-	-	-	2E-5		2E-4
		W, see ^{99m}Rh	-	4E+2	2E-7	5E-10	-		-
		Y, see ^{99m}Rh	-	1E+2	5E-8	2E-10	-		-
45	Rhodium-102	D, see ^{99m}Rh	6E+2	9E+1	4E-8	1E-10	8E-6		8E-5
		W, see ^{99m}Rh	-	2E+2	7E-8	2E-10	-		-
		Y, see ^{99m}Rh	-	6E+1	2E-8	8E-11	-		-
45	Rhodium-103m[2]	D, see ^{99m}Rh	4E+5	1E+6	5E-4	2E-6	6E-3		6E-2
		W, see ^{99m}Rh	-	1E+6	5E-4	2E-6	-		-
		Y, see ^{99m}Rh	-	1E+6	5E-4	2E-6	-		-
45	Rhodium-105	D, see ^{99m}Rh	4E+3	1E+4	5E-6	2E-8	-		-
			LLI wall (4E+3)	-	-	-	5E-5		5E-4
		W, see ^{99m}Rh	-	6E+3	3E-6	9E-9	-		-
		Y, see ^{99m}Rh	-	6E+3	2E-6	8E-9	-		-
45	Rhodium-106m	D, see ^{99m}Rh	8E+3	3E+4	1E-5	4E-8	1E-4		1E-3
		W, see ^{99m}Rh	-	4E+4	2E-5	5E-8	-		-
		Y, see ^{99m}Rh	-	4E+4	1E-5	5E-8	-		-
45	Rhodium-107[2]	D, see ^{99m}Rh	7E+4	2E+5	1E-4	3E-7	-		-
			St wall (9E+4)	-	-	-	1E-3		1E-2
		W, see ^{99m}Rh	-	3E+5	1E-4	4E-7	-		-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (μCi)	Col. 2 ALI (μCi)	Col. 3 Inhalation ALI (μCi/ml)	Table II Effluent Conc. Col. 1 DAC	Col. 2 Air	Water (μCi/ml)	Table III Releases to Sewers Monthly
		Y, see ^{99m}Rh	-	3E+5	1E-4	3E-7	-		-
46	Palladium-100	D, all compounds except those given for W and Y		1E+3	1E+3	6E-7	2E-9		2E-5
	2E-4								
		W, nitrates	-	1E+3	5E-7	2E-9	-		-
		Y, oxides and hydroxides	-	1E+3	6E-7	2E-9	-		-
46	Palladium-101	D, see ^{100}Pd	1E+4	3E+4	1E-5	5E-8	2E-4		2E-3
		W, see ^{100}Pd	-	3E+4	1E-5	5E-8	-		-
		Y, see ^{100}Pd	-	3E+4	1E-5	4E-8	-		-
46	Palladium-103	D, see ^{100}Pd	6E+3	6E+3	3E-6	9E-9	-		-
			LLI wall (7E+3)	-	-	-	1E-4		1E-3
		W, see ^{100}Pd	-	4E+3	2E-6	6E-9	-		-
		Y, see ^{100}Pd	-	4E+3	1E-6	5E-9	-		-
46	Palladium-107	D, see ^{100}Pd	3E+4	2E+4	9E-6	-	-		-
			LLI wall (4E+4)	(2E+4)	Kidneys -	3E-8	5E-4		5E-3
		W, see ^{100}Pd	-	7E+3	3E-6	1E-8	-		-
		Y, see ^{100}Pd	-	4E+2	2E-7	6E-10	-		-
46	Palladium-109	D, see ^{100}Pd	2E+3	6E+3	3E-6	9E-9	3E-5		3E-4
		W, see ^{100}Pd	-	5E+3	2E-6	8E-9	-		-
		Y, see ^{100}Pd	-	5E+3	2E-6	6E-9	-		-
47	Silver-102[2]	D, all compounds except those given for W and Y		5E+4	2E+5	8E-5	2E-7		-
	-								
			St wall (6E+4)	-	-	-	9E-4		9E-3
		W, nitrates and sulfides	-	2E+5	9E-5	3E-7	-		-
		Y, oxides and hydroxides	-	2E+5	8E-5	3E-7	-		-
47	Silver-103[2]	D, see ^{102}Ag	4E+4	1E+5	4E-5	1E-7	5E-4		5E-3
		W, see ^{102}Ag	-	1E+5	5E-5	2E-7	-		-
		Y, see ^{102}Ag	-	1E+5	5E-5	2E-7	-		-
47	Silver-104m[2]	D, see ^{102}Ag	3E+4	9E+4	4E-5	1E-7	4E-4		4E-3
		W, see ^{102}Ag	-	1E+5	5E-5	2E-7	-		-
		Y, see ^{102}Ag	-	1E+5	5E-5	2E-7	-		-
47	Silver-104[2]	D, see ^{102}Ag	2E+4	7E+4	3E-5	1E-7	3E-4		3E-3
		W, see ^{102}Ag	-	1E+5	6E-5	2E-7	-		-
		Y, see ^{102}Ag	-	1E+5	6E-5	2E-7	-		-
47	Silver-105	D, see ^{102}Ag	3E+3	1E+3	4E-7	1E-9	4E-5		4E-4
		W, see ^{102}Ag	-	2E+3	7E-7	2E-9	-		-

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (µCi)	Col. 2 Oral Ingestion ALI (µCi)	Col. 3 Inhalation ALI (µCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (µCi/ml)	Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly
		Y, see ^{102}Ag	-	2E+3	7E-7	2E-9	-		-
47	Silver-106m	D, see ^{102}Ag	8E+2	7E+2	3E-7	1E-9	1E-5		1E-4
		W, see ^{102}Ag	-	9E+2	4E-7	1E-9	-		-
		Y, see ^{102}Ag	-	9E+2	4E-7	1E-9	-		-
47	Silver-106[2]	D, see ^{102}Ag	6E+4	2E+5	8E-5	3E-7	-		-
			St. wall (6E+4)	-	-	-	9E-4		9E-3
		W, see ^{102}Ag	-	2E+5	9E-5	3E-7	-		-
		Y, see ^{102}Ag	-	2E+5	8E-5	3E-7	-		-
47	Silver-108m	D, see ^{102}Ag	6E+2	2E+2	8E-8	3E-10	9E-6		9E-5
		W, see ^{102}Ag	-	3E+2	1E-7	4E-10	-		-
		Y, see ^{102}Ag	-	2E+1	1E-8	3E-11	-		-
47	Silver-110m	D, see ^{102}Ag	5E+2	1E+2	5E-8	2E-10	6E-6		6E-5
		W, see ^{102}Ag	-	2E+2	8E-8	3E-10	-		-
		Y, see ^{102}Ag	-	9E+1	4E-8	1E-10	-		-
47	Silver-111	D, see ^{102}Ag	9E+2	2E+3	6E-7	-	-		-
			LLI wall (1E+3)	(2E+3)	Liver -	2E-9	2E-5		2E-4
		W, see ^{102}Ag	-	9E+2	4E-7	1E-9	-		-
		Y, see ^{102}Ag	-	9E+2	4E-7	1E-9	-		-
47	Silver-112	D, see ^{102}Ag	3E+3	8E+3	3E-6	1E-8	4E-5		4E-4
		W, see ^{102}Ag	-	1E+4	4E-6	1E-8	-		-
		Y, see ^{102}Ag	-	9E+3	4E-6	1E-8	-		-
47	Silver-115[2]	D, see ^{102}Ag	3E+4	9E+4	4E-5	1E-7	-		-
			St wall (3E+4)	-	-	-	4E-4		4E-3
		W, see ^{102}Ag	-	9E+4	4E-5	1E-7	-		-
		Y, see ^{102}Ag	-	8E+4	3E-5	1E-7	-		-
48	Cadmium-104[2]	D, all compounds except those given for W and Y		2E+4	7E+4	3E-5	9E-8		3E-4
	3E-3								
		W, sulfides, halides, and nitrates	-	1E+5	5E-5	2E-7	-		-
		Y, oxides and hydroxides	-	1E+5	5E-5	2E-7	-		-
48	Cadmium-107	D, see ^{104}Cd	2E+4	5E+4	2E-5	8E-8	3E-4		3E-3
		W, see ^{104}Cd	-	6E+4	2E-5	8E-8	-		-
		Y, see ^{104}Cd	-	5E+4	2E-5	7E-8	-		-
48	Cadmium-109	D, see ^{104}Cd	3E+2	4E+1	1E-8	-	-		-
			Kidneys (4E+2)	Kidneys (5E+1)	-	7E-11	6E-6		6E-5

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation			Monthly
			ALI	ALI	DAC	Air	Water	
	(µCi/ml)		(µCi)	(µCi)	(µCi/ml)	(µCi/ml)		
		W, see ^{104}Cd	-	1E+2 Kidneys	5E-8	-	-	-
			-	(1E+2)	-	2E-10	-	-
		Y, see ^{104}Cd	-	1E+2	5E-8	2E-10	-	-
48	Cadmium-113m	D, see ^{104}Cd	2E+1 Kidneys	2E+0 Kidneys	1E-9	-	-	-
			(4E+1)	(4E+0)	-	5E-12	5E-7	5E-6
		W, see ^{104}Cd	-	8E+0 Kidneys	4E-9	-	-	-
			-	(1E+1)	-	2E-11	-	-
		Y, see ^{104}Cd	-	1E+1	5E-9	2E-11	-	-
48	Cadmium-113	D, see ^{104}Cd	2E+1 Kidneys	2E+0 Kidneys	9E-10	-	-	-
			(3E+1)	(3E+0)	-	5E-12	4E-7	4E-6
		W, see ^{104}Cd	-	8E+0 Kidneys	3E-9	-	-	-
			-	(1E+1)	-	2E-11	-	-
		Y, see ^{104}Cd	-	1E+1	6E-9	2E-11	-	-
48	Cadmium-115m	D, see ^{104}Cd	3E+2	5E+1 Kidneys	2E-8	-	4E-6	4E-5
			-	(8E+1)	-	1E-10	-	-
		W, see ^{104}Cd	-	1E+2	5E-8	2E-10	-	-
		Y, see ^{104}Cd	-	1E+2	6E-8	2E-10	-	-
48	Cadmium-115	D, see ^{104}Cd	9E+2 LLI wall	1E+3	6E-7	2E-9	-	-
			(1E+3)	-	-	-	1E-5	1E-4
		W, see ^{104}Cd	-	1E+3	5E-7	2E-9	-	-
		Y, see ^{104}Cd	-	1E+3	6E-7	2E-9	-	-
48	Cadmium-117m	D, see ^{104}Cd	5E+3	1E+4	5E-6	2E-8	6E-5	6E-4
		W, see ^{104}Cd	-	2E+4	7E-6	2E-8	-	-
		Y, see ^{104}Cd	-	1E+4	6E-6	2E-8	-	-
48	Cadmium-117	D, see ^{104}Cd	5E+3	1E+4	5E-6	2E-8	6E-5	6E-4
		W, see ^{104}Cd	-	2E+4	7E-6	2E-8	-	-
		Y, see ^{104}Cd	-	1E+4	6E-6	2E-8	-	-
49	Indium-109	D, all compounds except those given for W	2E+4	4E+4	2E-5	6E-8	3E-4	3E-3
		W, oxides, hydroxides, halides, and nitrates	-	6E+4	3E-5	9E-8	-	-
49	Indium-110[2] (69.1 min)	D, see ^{109}In	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{109}In	-	6E+4	2E-5	8E-8	-	-
49	Indium-110	D, see ^{109}In	5E+3	2E+4	7E-6	2E-8	7E-5	7E-4

Atomic No.	Radionuclide	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI	ALI	DAC	Air	Water	
	(4.9 hr)	W, see ^{109}In	-	2E+4	8E-6	3E-8	-	-
49	Indium-111	D, see ^{109}In	4E+3	6E+3	3E-6	9E-9	6E-5	6E-4
		W, see ^{109}In	-	6E+3	3E-6	9E-9	-	-
49	Indium-112[2]	D, see ^{109}In	2E+5	6E+5	3E-4	9E-7	2E-3	2E-2
		W, see ^{109}In	-	7E+5	3E-4	1E-6	-	-
49	Indium-113m[2]	D, see ^{109}In	5E+4	1E+5	6E-5	2E-7	7E-4	7E-3
		W, see ^{109}In	-	2E+5	8E-5	3E-7	-	-
49	Indium-114m	D, see ^{109}In	3E+2 LLI wall (4E+2)	6E+1	3E-8	9E-11	-	-
			-	-	-	-	5E-6	5E-5
		W, see ^{109}In	-	1E+2	4E-8	1E-10	-	-
49	Indium-115m	D, see ^{109}In	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{109}In	-	5E+4	2E-5	7E-8	-	-
49	Indium-115	D, see ^{109}In	4E+1	1E+0	6E-10	2E-12	5E-7	5E-6
		W, see ^{109}In	-	5E+0	2E-9	8E-12	-	-
49	Indium-116m[2]	D, see ^{109}In	2E+4	8E+4	3E-5	1E-7	3E-4	3E-3
		W, see ^{109}In	-	1E+5	5E-5	2E-7	-	-
49	Indium-117m[2]	D, see ^{109}In	1E+4	3E+4	1E-5	5E-8	2E-4	2E-3
		W, see ^{109}In	-	4E+4	2E-5	6E-8	-	-
49	Indium-117[2]	D, see ^{109}In	6E+4	2E+5	7E-5	2E-7	8E-4	8E-3
		W, see ^{109}In	-	2E+5	9E-5	3E-7	-	-
49	Indium-119m[2]	D, see ^{109}In	4E+4 St wall (5E+4)	1E+5	5E-5	2E-7	-	-
			-	-	-	-	7E-4	7E-3
		W, see ^{109}In	-	1E+5	6E-5	2E-7	-	-
50	Tin-110	D, all compounds except those given for W	4E+3	1E+4	5E-6	2E-8	5E-5	5E-4
		W, sulfides, oxides, hydroxides, halides, nitrates, and stannic phosphate	-	1E+4	5E-6	2E-8	-	-
50	Tin-111[2]	D, see ^{110}Sn	7E+4	2E+5	9E-5	3E-7	1E-3	1E-2
		W, see ^{110}Sn	-	3E+5	1E-4	4E-7	-	-
50	Tin-113	D, see ^{110}Sn	2E+3 LLI wall (2E+3)	1E+3	5E-7	2E-9	-	-
			-	-	-	-	3E-5	3E-4
		W, see ^{110}Sn	-	5E+2	2E-7	8E-10	-	-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			(μCi)	ALI (μCi)	ALI (μCi/ml)	DAC	Air Water (μCi/ml)	
50	Tin-117m	D, see ^{110}Sn	2E+3	1E+3	5E-7	-	-	-
			LLI wall (2E+3)	(2E+3)	Bone surf -	3E-9	3E-5	3E-4
		W, see ^{110}Sn	-	1E+3	6E-7	2E-9	-	-
50	Tin-119m	D, see ^{110}Sn	3E+3	2E+3	1E-6	3E-9	-	-
			LLI wall (4E+3)	-	-	-	6E-5	6E-4
		W, see ^{110}Sn	-	1E+3	4E-7	1E-9	-	-
50	Tin-121m	D, see ^{110}Sn	3E+3	9E+2	4E-7	1E-9	-	-
			LLI wall (4E+3)	-	-	-	5E-5	5E-4
		W, see ^{110}Sn	-	5E+2	2E-7	8E-10	-	-
50	Tin-121	D, see ^{110}Sn	6E+3	2E+4	6E-6	2E-8	-	-
			LLI wall (6E+3)	-	-	-	8E-5	8E-4
		W, see ^{110}Sn	-	1E+4	5E-6	2E-8	-	-
50	Tin-123m[2]	D, see ^{110}Sn	5E+4	1E+5	5E-5	2E-7	7E-4	7E-3
		W, see ^{110}Sn	-	1E+5	6E-5	2E-7	-	-
50	Tin-123	D, see ^{110}Sn	5E+2	6E+2	3E-7	9E-10	-	-
			LLI wall (6E+2)	-	-	-	9E-6	9E-5
		W, see ^{110}Sn	-	2E+2	7E-8	2E-10	-	-
50	Tin-125	D, see ^{110}Sn	4E+2	9E+2	4E-7	1E-9	-	-
			LLI wall (5E+2)	-	-	-	6E-6	6E-5
		W, see ^{110}Sn	-	4E+2	1E-7	5E-10	-	-
50	Tin-126	D, see ^{110}Sn	3E+2	6E+1	2E-8	8E-11	4E-6	4E-5
		W, see ^{110}Sn	-	7E+1	3E-8	9E-11	-	-
50	Tin-127	D, see ^{110}Sn	7E+3	2E+4	8E-6	3E-8	9E-5	9E-4
		W, see ^{110}Sn	-	2E+4	8E-6	3E-8	-	-
50	Tin-128[2]	D, see ^{110}Sn	9E+3	3E+4	1E-5	4E-8	1E-4	1E-3
		W, see ^{110}Sn	-	4E+4	1E-5	5E-8	-	-
51	Antimony-115[2]	D, all compounds except those given for W	8E+4	2E+5	1E-4	3E-7	1E-3	1E-2
		W, oxides, hydroxides, halides, sulfides, sulfates, and nitrates		-	3E+5	1E-4	4E-7	-
	-							
51	Antimony-116m[2]	D, see ^{115}Sb	2E+4	7E+4	3E-5	1E-7	3E-4	3E-3

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			(μCi)	ALI (μCi)	ALI (μCi/ml)	DAC	Air (μCi/ml)	Water
		W, see ^{115}Sb	-	1E+5	6E-5	2E-7	-	-
51	Antimony-116[2]	D, see ^{115}Sb	7E+4	3E+5	1E-4	4E-7	-	-
			St wall (9E+4)	-	-	-	1E-3	1E-2
		W, see ^{115}Sb	-	3E+5	1E-4	5E-7	-	-
51	Antimony-117	D, see ^{115}Sb	7E+4	2E+5	9E-5	3E-7	9E-4	9E-3
		W, see ^{115}Sb	-	3E+5	1E-4	4E-7	-	-
51	Antimony-118m	D, see ^{115}Sb	6E+3	2E+4	8E-6	3E-8	7E-5	7E-4
		W, see ^{115}Sb	5E+3	2E+4	9E-6	3E-8	-	-
51	Antimony-119	D, see ^{115}Sb	2E+4	5E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{115}Sb	2E+4	3E+4	1E-5	4E-8	-	-
51	Antimony-120[2] (16 min)	D, see ^{115}Sb	1E+5	4E+5	2E-4	6E-7	-	-
			St wall (2E+5)	-	-	-	2E-3	2E-2
		W, see ^{115}Sb	-	5E+5	2E-4	7E-7	-	-
51	Antimony-120 (5.76 days)	D, see ^{115}Sb	1E+3	2E+3	9E-7	3E-9	1E-5	1E-4
		W, see ^{115}Sb	9E+2	1E+3	5E-7	2E-9	-	-
51	Antimony-122	D, see ^{115}Sb	8E+2	2E+3	1E-6	3E-9	-	-
			LLI wall (8E+2)	-	-	-	1E-5	1E-4
		W, see ^{115}Sb	7E+2	1E+3	4E-7	2E-9	-	-
51	Antimony-124m[2]	D, see ^{115}Sb	3E+5	8E+5	4E-4	1E-6	3E-3	3E-2
		W, see ^{115}Sb	2E+5	6E+5	2E-4	8E-7	-	-
51	Antimony-124	D, see ^{115}Sb	6E+2	9E+2	4E-7	1E-9	7E-6	7E-5
		W, see ^{115}Sb	5E+2	2E+2	1E-7	3E-10	-	-
51	Antimony-125	D, see ^{115}Sb	2E+3	2E+3	1E-6	3E-9	3E-5	3E-4
		W, see ^{115}Sb	-	5E+2	2E-7	7E-10	-	-
51	Antimony-126m[2]	D, see ^{115}Sb	5E+4	2E+5	8E-5	3E-7	-	-
			St wall (7E+4)	-	-	-	9E-4	9E-3
		W, see ^{115}Sb	-	2E+5	8E-5	3E-7	-	-
51	Antimony-126	D, see ^{115}Sb	6E+2	1E+3	5E-7	2E-9	7E-6	7E-5
		W, see ^{115}Sb	5E+2	5E+2	2E-7	7E-10	-	-
51	Antimony-127	D, see ^{115}Sb	8E+2	2E+3	9E-7	3E-9	-	-
			LLI wall (8E+2)	-	-	-	1E-5	1E-4
		W, see ^{115}Sb	7E+2	9E+2	4E-7	1E-9	-	-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (μCi)	Col. 2 Oral Ingestion ALI (μCi)	Col. 3 Inhalation ALI (μCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (μCi/ml)	Col. 2 Water (μCi/ml)	Table III Releases to Sewers Monthly
51	Antimony-128[2] (10.4 min)	D, see ^{115}Sb	8E+4	4E+5	2E-4	5E-7	-		-
			St wall (1E+5)	-	-	-	1E-3		1E-2
		W, see ^{115}Sb	-	4E+5	2E-4	6E-7	-		-
51	Antimony-128 (9.01 hr)	D, see ^{115}Sb	1E+3	4E+3	2E-6	6E-9	2E-5		2E-4
		W, see ^{115}Sb	-	3E+3	1E-6	5E-9	-		-
51	Antimony-129	D, see ^{115}Sb	3E+3	9E+3	4E-6	1E-8	4E-5		4E-4
		W, see ^{115}Sb	-	9E+3	4E-6	1E-8	-		-
51	Antimony-130[2]	D, see ^{115}Sb	2E+4	6E+4	3E-5	9E-8	3E-4		3E-3
		W, see ^{115}Sb	-	8E+4	3E-5	1E-7	-		-
51	Antimony-131[2]	D, see ^{115}Sb	1E+4	2E+4	1E-5	-	-		-
			Thyroid (2E+4)	Thyroid (4E+4)	-	6E-8	2E-4		2E-3
		W, see ^{115}Sb	-	2E+4	1E-5		-		-
				Thyroid					
			-	(4E+4)	-	6E-8	-		-
52	Tellurium-116	D, all compounds except those given for W	8E+3	2E+4	9E-6	3E-8	1E-4		1E-3
		W, oxides, hydroxides, and nitrates	-	3E+4	1E-5	4E-8	-		-
52	Tellurium-121m	D, see ^{116}Te	5E+2	2E+2	8E-8	-	-		-
			Bone surf (7E+2)	(4E+2)	Bone surf -	5E-10	1E-5		1E-4
		W, see ^{116}Te	-	4E+2	2E-7	6E-10	-		-
52	Tellurium-121	D, see ^{116}Te	3E+3	4E+3	2E-6	6E-9	4E-5		4E-4
		W, see ^{116}Te	-	3E+3	1E-6	4E-9	-		-
52	Tellurium-123m	D, see ^{116}Te	6E+2	2E+2	9E-8	-	-		-
			Bone surf (1E+3)	(5E+2)	Bone surf -	8E-10	1E-5		1E-4
		W, see ^{116}Te	-	5E+2	2E-7	8E-10	-		-
52	Tellurium-123	D, see ^{116}Te	5E+2	2E+2	8E-8	-	-		-
			Bone surf (1E+3)	(5E+2)	Bone surf -	7E-10	2E-5		2E-4
		W, see ^{116}Te	-	4E+2	2E-7	-	-		-
				Bone surf					
			-	(1E+3)	-	2E-9	-		-
52	Tellurium-125m	D, see ^{116}Te	1E+3	4E+2	2E-7	-	-		-
			Bone surf (1E+3)	(1E+3)	Bone surf -	1E-9	2E-5		2E-4
		W, see ^{116}Te	-	7E+2	3E-7	1E-9	-		-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			(μCi)	ALI (μCi)	ALI (μCi/ml)	DAC	Air Water (μCi/ml)	
52	Tellurium-127m	D, see ^{116}Te	6E+2	3E+2	1E-7	-	9E-6	9E-5
			-	Bone surf (4E+2)	-	6E-10	-	-
		W, see ^{116}Te	-	3E+2	1E-7	4E-10	-	-
52	Tellurium-127	D, see ^{116}Te	7E+3	2E+4	9E-6	3E-8	1E-4	1E-3
		W, see ^{116}Te	-	2E+4	7E-6	2E-8	-	-
52	Tellurium-129m	D, see ^{116}Te	5E+2	6E+2	3E-7	9E-10	7E-6	7E-5
		W, see ^{116}Te	-	2E+2	1E-7	3E-10	-	-
52	Tellurium-129[2]	D, see ^{116}Te	3E+4	6E+4	3E-5	9E-8	4E-4	4E-3
		W, see ^{116}Te	-	7E+4	3E-5	1E-7	-	-
52	Tellurium-131m	D, see ^{116}Te	3E+2	4E+2	2E-7	-	-	-
			Thyroid (6E+2)	Thyroid (1E+3)	-	2E-9	8E-6	8E-5
		W, see ^{116}Te	-	4E+2 Thyroid	2E-7	-	-	-
			-	(9E+2)	-	1E-9	-	-
52	Tellurium-131[2]	D, see ^{116}Te	3E+3	5E+3	2E-6	-	-	-
			Thyroid (6E+3)	Thyroid (1E+4)	-	2E-8	8E-5	8E-4
		W, see ^{116}Te	-	5E+3 Thyroid	2E-6	-	-	-
			-	(1E+4)	-	2E-8	-	-
52	Tellurium-132	D, see ^{116}Te	2E+2	2E+2	9E-8	-	-	-
			Thyroid (7E+2)	Thyroid (8E+2)	-	1E-9	9E-6	9E-5
		W, see ^{116}Te	-	2E+2 Thyroid	9E-8	-	-	-
			-	(6E+2)	-	9E-10	-	-
52	Tellurium-133m[2]	D, see ^{116}Te	3E+3	5E+3	2E-6	-	-	-
			Thyroid (6E+3)	Thyroid (1E+4)	-	2E-8	9E-5	9E-4
		W, see ^{116}Te	-	5E+3 Thyroid	2E-6	-	-	-
			-	(1E+4)	-	2E-8	-	-
52	Tellurium-133[2]	D, see ^{116}Te	1E+4	2E+4	9E-6	-	-	-
			Thyroid (3E+4)	Thyroid (6E+4)	-	8E-8	4E-4	4E-3
		W, see ^{116}Te	-	2E+4 Thyroid	9E-6	-	-	-
			-	(6E+4)	-	8E-8	-	-
52	Tellurium-134[2]	D, see ^{116}Te	2E+4	2E+4	1E-5	-	-	-

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Col. 2 ALI (µCi)	Col. 3 Inhalation ALI (µCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air	Col. 2 Water	Table III Releases to Sewers Monthly (µCi/ml)
			Thyroid (2E+4)	Thyroid (5E+4)	-	7E-8	3E-4		3E-3
		W, see ^{116}Te	-	2E+4	1E-5	-	-		-
			-	Thyroid (5E+4)	-	7E-8	-		-
53	Iodine-120m[2]	D, all compounds	1E+4	2E+4	9E-6	3E-8	-		-
			Thyroid (1E+4)	-	-	-	2E-4		2E-3
53	Iodine-120[2]	D, all compounds	4E+3	9E+3	4E-6	-	-		-
			Thyroid (8E+3)	Thyroid (1E+4)	-	2E-8	1E-4		1E-3
53	Iodine-121	D, all compounds	1E+4	2E+4	8E-6	-	-		-
			Thyroid (3E+4)	Thyroid (5E+4)	-	7E-8	4E-4		4E-3
53	Iodine-123	D, all compounds	3E+3	6E+3	3E-6	-	-		-
			Thyroid (1E+4)	Thyroid (2E+4)	-	2E-8	1E-4		1E-3
53	Iodine-124	D, all compounds	5E+1	8E+1	3E-8	-	-		-
			Thyroid (2E+2)	Thyroid (3E+2)	-	4E-10	2E-6		2E-5
53	Iodine-125	D, all compounds	4E+1	6E+1	3E-8	-	-		-
			Thyroid (1E+2)	Thyroid (2E+2)	-	3E-10	2E-6		2E-5
53	Iodine-126	D, all compounds	2E+1	4E+1	1E-8	-	-		-
			Thyroid (7E+1)	Thyroid (1E+2)	-	2E-10	1E-6		1E-5
53	Iodine-128[2]	D, all compounds	4E+4	1E+5	5E-5	2E-7	-		-
			St wall (6E+4)	-	-	-	8E-4		8E-3
53	Iodine-129	D, all compounds	5E+0	9E+0	4E-9	-	-		-
			Thyroid (2E+1)	Thyroid (3E+1)	-	4E-11	2E-7		2E-6
53	Iodine-130	D, all compounds	4E+2	7E+2	3E-7	-	-		-
			Thyroid (1E+3)	Thyroid (2E+3)	-	3E-9	2E-5		2E-4
53	Iodine-131	D, all compounds	3E+1	5E+1	2E-8	-	-		-
			Thyroid (9E+1)	Thyroid (2E+2)	-	2E-10	1E-6		1E-5

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion		Inhalation			Monthly
			ALI		ALI	DAC	Air Water	
			(µCi)	(µCi)	(µCi/ml)		(µCi/ml)	
53	Iodine-132m[2]	D, all compounds	4E+3 Thyroid (1E+4)	8E+3 Thyroid (2E+4)	4E-6 -	- 3E-8	- 1E-4	- 1E-3
53	Iodine-132	D, all compounds	4E+3 Thyroid (9E+3)	8E+3 Thyroid (1E+4)	3E-6 -	- 2E-8	- 1E-4	- 1E-3
53	Iodine-133	D, all compounds	1E+2 Thyroid (5E+2)	3E+2 Thyroid (9E+2)	1E-7 -	- 1E-9	- 7E-6	- 7E-5
53	Iodine-134[2]	D, all compounds	2E+4 Thyroid (3E+4)	5E+4 -	2E-5 -	6E-8 -	- 4E-4	- 4E-3
53	Iodine-135	D, all compounds	8E+2 Thyroid (3E+3)	2E+3 Thyroid (4E+3)	7E-7 -	- 6E-9	- 3E-5	- 3E-4
54	Xenon-120[2]	Submersion[1]	-	-	1E-5	4E-8	-	-
54	Xenon-121[2]	Submersion[1]	-	-	2E-6	1E-8	-	-
54	Xenon-122	Submersion[1]	-	-	7E-5	3E-7	-	-
54	Xenon-123	Submersion[1]	-	-	6E-6	3E-8	-	-
54	Xenon-125	Submersion[1]	-	-	2E-5	7E-8	-	-
54	Xenon-127	Submersion[1]	-	-	1E-5	6E-8	-	-
54	Xenon-129m	Submersion[1]	-	-	2E-4	9E-7	-	-
54	Xenon-131m	Submersion[1]	-	-	4E-4	2E-6	-	-
54	Xenon-133m	Submersion[1]	-	-	1E-4	6E-7	-	-
54	Xenon-133	Submersion[1]	-	-	1E-4	5E-7	-	-
54	Xenon-135m[2]	Submersion[1]	-	-	9E-6	4E-8	-	-
54	Xenon-135	Submersion[1]	-	-	1E-5	7E-8	-	-
54	Xenon-138[2]	Submersion[1]	-	-	4E-6	2E-8	-	-
55	Cesium-125[2]	D, all compounds	5E+4 St wall (9E+4)	1E+5 -	6E-5 -	2E-7 -	- 1E-3	- 1E-2

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion		Inhalation			Monthly
				ALI	ALI	DAC	Air Water	
			(µCi)	(µCi)	(µCi/ml)		(µCi/ml)	
55	Cesium-127	D, all compounds	6E+4	9E+4	4E-5	1E-7	9E-4	9E-3
55	Cesium-129	D, all compounds	2E+4	3E+4	1E-5	5E-8	3E-4	3E-3
55	Cesium-130[2]	D, all compounds	6E+4	2E+5	8E-5	3E-7	-	-
			St wall (1E+5)	-	-	-	1E-3	1E-2
55	Cesium-131	D, all compounds	2E+4	3E+4	1E-5	4E-8	3E-4	3E-3
55	Cesium-132	D, all compounds	3E+3	4E+3	2E-6	6E-9	4E-5	4E-4
55	Cesium-134m	D, all compounds	1E+5	1E+5	6E-5	2E-7	-	-
			St wall (1E+5)	-	-	-	2E-3	2E-2
55	Cesium-134	D, all compounds	7E+1	1E+2	4E-8	2E-10	9E-7	9E-6
55	Cesium-135m[2]	D, all compounds	1E+5	2E+5	8E-5	3E-7	1E-3	1E-2
55	Cesium-135	D, all compounds	7E+2	1E+3	5E-7	2E-9	1E-5	1E-4
55	Cesium-136	D, all compounds	4E+2	7E+2	3E-7	9E-10	6E-6	6E-5
55	Cesium-137	D, all compounds	1E+2	2E+2	6E-8	2E-10	1E-6	1E-5
55	Cesium-138[2]	D, all compounds	2E+4	6E+4	2E-5	8E-8	-	-
			St wall (3E+4)	-	-	-	4E-4	4E-3
56	Barium-126[2]	D, all compounds	6E+3	2E+4	6E-6	2E-8	8E-5	8E-4
56	Barium-128	D, all compounds	5E+2	2E+3	7E-7	2E-9	7E-6	7E-5
56	Barium-131m[2]	D, all compounds	4E+5	1E+6	6E-4	2E-6	-	-
			St wall (5E+5)	-	-	-	7E-3	7E-2
56	Barium-131	D, all compounds	3E+3	8E+3	3E-6	1E-8	4E-5	4E-4
56	Barium-133m	D, all compounds	2E+3	9E+3	4E-6	1E-8	-	-
			LLI wall (3E+3)	-	-	-	4E-5	4E-4
56	Barium-133	D, all compounds	2E+3	7E+2	3E-7	9E-10	2E-5	2E-4
56	Barium-135m	D, all compounds	3E+3	1E+4	5E-6	2E-8	4E-5	4E-4
56	Barium-139[2]	D, all compounds	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (µCi)	Col. 2 ALI (µCi)	Col. 3 Inhalation ALI (µCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (µCi/ml)	Water (µCi/ml)	Table III Releases to Sewers Monthly
56	Barium-140	D, all compounds	5E+2	1E+3	6E-7	2E-9	-		-
			LLI wall (6E+2)	-	-	-	8E-6		8E-5
56	Barium-141[2]	D, all compounds	2E+4	7E+4	3E-5	1E-7	3E-4		3E-3
56	Barium-142[2]	D, all compounds	5E+4	1E+5	6E-5	2E-7	7E-4		7E-3
57	Lanthanum-131[2]	D, all compounds except those given for W	5E+4	1E+5	5E-5	2E-7	6E-4		6E-3
		W, oxides and hydroxides	-	2E+5	7E-5	2E-7	-		-
57	Lanthanum-132	D, see ^{131}La	3E+3	1E+4	4E-6	1E-8	4E-5		4E-4
		W, see ^{131}La	-	1E+4	5E-6	2E-8	-		-
57	Lanthanum-135	D, see ^{131}La	4E+4	1E+5	4E-5	1E-7	5E-4		5E-3
		W, see ^{131}La	-	9E+4	4E-5	1E-7	-		-
57	Lanthanum-137	D, see ^{131}La	1E+4	6E+1	3E-8	-	2E-4		2E-3
				Liver					
			-	(7E+1)	-	1E-10	-		-
		W, see ^{131}La	-	3E+2	1E-7	-	-		-
				Liver					
			-	(3E+2)	-	4E-10	-		-
57	Lanthanum-138	D, see ^{131}La	9E+2	4E+0	1E-9	5E-12	1E-5		1E-4
		W, see ^{131}La	-	1E+1	6E-9	2E-11	-		-
57	Lanthanum-140	D, see ^{131}La	6E+2	1E+3	6E-7	2E-9	9E-6		9E-5
		W, see ^{131}La	-	1E+3	5E-7	2E-9	-		-
57	Lanthanum-141	D, see ^{131}La	4E+3	9E+3	4E-6	1E-8	5E-5		5E-4
		W, see ^{131}La	-	1E+4	5E-6	2E-8	-		-
57	Lanthanum-142[2]	D, see ^{131}La	8E+3	2E+4	9E-6	3E-8	1E-4		1E-3
		W, see ^{131}La	-	3E+4	1E-5	5E-8	-		-
57	Lanthanum-143[2]	D, see ^{131}La	4E+4	1E+5	4E-5	1E-7	-		-
			St wall (4E+4)	-	-	-	5E-4		5E-3
		W, see ^{131}La	-	9E+4	4E-5	1E-7	-		-
58	Cerium-134	W, all compounds except those given for Y	5E+2	7E+2	3E-7	1E-9	-		-
			LLI wall (6E+2)	-	-	-	8E-6		8E-5
		Y, oxides, hydroxides, and fluorides	-	7E+2	3E-7	9E-10	-		-
58	Cerium-135	W, see ^{134}Ce	2E+3	4E+3	2E-6	5E-9	2E-5		2E-4

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (µCi)	Col. 2 ALI (µCi)	Col. 3 Inhalation ALI (µCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (µCi/ml)	Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly
		Y, see ^{134}Ce	-	4E+3	1E-6	5E-9	-		-
58	Cerium-137m	W, see ^{134}Ce	2E+3	4E+3	2E-6	6E-9	-		-
			LLI wall (2E+3)	-	-	-	3E-5		3E-4
		Y, see ^{134}Ce	-	4E+3	2E-6	5E-9	-		-
58	Cerium-137	W, see ^{134}Ce	5E+4	1E+5	6E-5	2E-7	7E-4		7E-3
		Y, see ^{134}Ce	-	1E+5	5E-5	2E-7	-		-
58	Cerium-139	W, see ^{134}Ce	5E+3	8E+2	3E-7	1E-9	7E-5		7E-4
		Y, see ^{134}Ce	-	7E+2	3E-7	9E-10	-		-
58	Cerium-141	W, see ^{134}Ce	2E+3	7E+2	3E-7	1E-9	-		-
			LLI wall (2E+3)	-	-	-	3E-5		3E-4
		Y, see ^{134}Ce	-	6E+2	2E-7	8E-10	-		-
58	Cerium-143	W, see ^{134}Ce	1E+3	2E+3	8E-7	3E-9	-		-
			LLI wall (1E+3)	-	-	-	2E-5		2E-4
		Y, see ^{134}Ce	-	2E+3	7E-7	2E-9	-		-
58	Cerium-144	W, see ^{134}Ce	2E+2	3E+1	1E-8	4E-11	-		-
			LLI wall (3E+2)	-	-	-	3E-6		3E-5
		Y, see ^{134}Ce	-	1E+1	6E-9	2E-11	-		-
59	Praseodymium-136[2]	W, all compounds except those given for Y	5E+4	2E+5	1E-4	3E-7	-		-
			St wall (7E+4)	-	-	-	1E-3		1E-2
	-	Y, oxides, hydroxides, carbides, and fluorides		-	2E+5	9E-5	3E-7		-
59	Praseodymium-137[2]	W, see ^{136}Pr	4E+4	2E+5	6E-5	2E-7	5E-4		5E-3
		Y, see ^{136}Pr	-	1E+5	6E-5	2E-7	-		-
59	Praseodymium-138m	W, see ^{136}Pr	1E+4	5E+4	2E-5	8E-8	1E-4		1E-3
		Y, see ^{136}Pr	-	4E+4	2E-5	6E-8	-		-
59	Praseodymium-139	W, see ^{136}Pr	4E+4	1E+5	5E-5	2E-7	6E-4		6E-3
		Y, see ^{136}Pr	-	1E+5	5E-5	2E-7	-		-
59	Praseodymium-142m[2]	W, see ^{136}Pr	8E+4	2E+5	7E-5	2E-7	1E-3		1E-2
		Y, see ^{136}Pr	-	1E+5	6E-5	2E-7	-		-
59	Praseodymium-142	W, see ^{136}Pr	1E+3	2E+3	9E-7	3E-9	1E-5		1E-4
		Y, see ^{136}Pr	-	2E+3	8E-7	3E-9	-		-

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (µCi)	Col. 2 ALI (µCi)	Col. 3 Inhalation ALI (µCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (µCi/ml)	Water (µCi/ml)	Table III Releases to Sewers Monthly
59	Praseodymium-143	W, see ^{136}Pr	9E+2	8E+2	3E-7	1E-9	-		-
			LLI wall (1E+3)	-	-	-	2E-5		2E-4
		Y, see ^{136}Pr	-	7E+2	3E-7	9E-10	-		-
59	Praseodymium-144[2]	W, see ^{136}Pr	3E+4	1E+5	5E-5	2E-7	-		-
			St wall (4E+4)	-	-	-	6E-4		6E-3
		Y, see ^{136}Pr	-	1E+5	5E-5	2E-7	-		-
59	Praseodymium-145	W, see ^{136}Pr	3E+3	9E+3	4E-6	1E-8	4E-5		4E-4
		Y, see ^{136}Pr	-	8E+3	3E-6	1E-8	-		-
59	Praseodymium-147[2]	W, see ^{136}Pr	5E+4	2E+5	8E-5	3E-7	-		-
			St wall (8E+4)	-	-	-	1E-3		1E-2
		Y, see ^{136}Pr	-	2E+5	8E-5	3E-7	-		-
60	Neodymium-136[2]	W, all compounds except those given for Y	1E+4	6E+4	2E-5	8E-8	2E-4		2E-3
	-	Y, oxides, hydroxides, carbides, and fluorides		-	5E+4	2E-5	8E-8		-
60	Neodymium-138	W, see ^{136}Nd	2E+3	6E+3	3E-6	9E-9	3E-5		3E-4
		Y, see ^{136}Nd	-	5E+3	2E-6	7E-9	-		-
60	Neodymium-139m	W, see ^{136}Nd	5E+3	2E+4	7E-6	2E-8	7E-5		7E-4
		Y, see ^{136}Nd	-	1E+4	6E-6	2E-8	-		-
60	Neodymium-139[2]	W, see ^{136}Nd	9E+4	3E+5	1E-4	5E-7	1E-3		1E-2
		Y, see ^{136}Nd	-	3E+5	1E-4	4E-7	-		-
60	Neodymium-141	W, see ^{136}Nd	2E+5	7E+5	3E-4	1E-6	2E-3		2E-2
		Y, see ^{136}Nd	-	6E+5	3E-4	9E-7	-		-
60	Neodymium-147	W, see ^{136}Nd	1E+3	9E+2	4E-7	1E-9	-		-
			LLI wall (1E+3)	-	-	-	2E-5		2E-4
		Y, see ^{136}Nd	-	8E+2	4E-7	1E-9	-		-
60	Neodymium-149[2]	W, see ^{136}Nd	1E+4	3E+4	1E-5	4E-8	1E-4		1E-3
		Y, see ^{136}Nd	-	2E+4	1E-5	3E-8	-		-
60	Neodymium-151[2]	W, see ^{136}Nd	7E+4	2E+5	8E-5	3E-7	9E-4		9E-3
		Y, see ^{136}Nd	-	2E+5	8E-5	3E-7	-		-
61	Promethium-141[2]	W, all compounds except those given for Y	5E+4	2E+5	8E-5	3E-7	-		-
			St wall						

Atomic No.	Radionuclide (µCi/ml)	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (µCi)	Col. 2 Oral Ingestion ALI (µCi)	Col. 3 Inhalation ALI (µCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (µCi/ml)	Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly
			(6E+4)	-	-	-	8E-4		8E-3
		Y, oxides, hydroxides, carbides, and fluorides		-	2E+5	7E-5	2E-7		-
	-								
61	Promethium-143	W, see ^{141}Pm	5E+3	6E+2	2E-7	8E-10	7E-5		7E-4
		Y, see ^{141}Pm	-	7E+2	3E-7	1E-9	-		-
61	Promethium-144	W, see ^{141}Pm	1E+3	1E+2	5E-8	2E-10	2E-5		2E-4
		Y, see ^{141}Pm	-	1E+2	5E-8	2E-10	-		-
61	Promethium-145	W, see ^{141}Pm	1E+4	2E+2 Bone surf	7E-8	-	1E-4		1E-3
			-	(2E+2)	-	3E-10	-		-
		Y, see ^{141}Pm	-	2E+2	8E-8	3E-10	-		-
61	Promethium-146	W, see ^{141}Pm	2E+3	5E+1	2E-8	7E-11	2E-5		2E-4
		Y, see ^{141}Pm	-	4E+1	2E-8	6E-11	-		-
61	Promethium-147	W, see ^{141}Pm	4E+3 LLI wall	1E+2	5E-8 Bone surf	-	-		-
			(5E+3)	(2E+2)	-	3E-10	7E-5		7E-4
		Y, see ^{141}Pm	-	1E+2	6E-8	2E-10	-		-
61	Promethium-148m	W, see ^{141}Pm	7E+2	3E+2	1E-7	4E-10	1E-5		1E-4
		Y, see ^{141}Pm	-	3E+2	1E-7	5E-10	-		-
61	Promethium-148	W, see ^{141}Pm	4E+2 LLI wall	5E+2	2E-7	8E-10	-		-
			(5E+2)	-	-	-	7E-6		7E-5
		Y, see ^{141}Pm	-	5E+2	2E-7	7E-10	-		-
61	Promethium-149	W, see ^{141}Pm	1E+3 LLI wall	2E+3	8E-7	3E-9	-		-
			(1E+3)	-	-	-	2E-5		2E-4
		Y, see ^{141}Pm	-	2E+3	8E-7	2E-9	-		-
61	Promethium-150	W, see ^{141}Pm	5E+3	2E+4	8E-6	3E-8	7E-5		7E-4
		Y, see ^{141}Pm	-	2E+4	7E-6	2E-8	-		-
61	Promethium-151	W, see ^{141}Pm	2E+3	4E+3	1E-6	5E-9	2E-5		2E-4
		Y, see ^{141}Pm	-	3E+3	1E-6	4E-9	-		-
62	Samarium-141m[2]	W, all compounds	3E+4	1E+5	4E-5	1E-7	4E-4		4E-3
62	Samarium-141[2]	W, all compounds	5E+4 St wall	2E+5	8E-5	2E-7	-		-
			(6E+4)	-	-	-	8E-4		8E-3
62	Samarium-142[2]	W, all compounds	8E+3	3E+4	1E-5	4E-8	1E-4		1E-3

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion		Inhalation			Monthly
			ALI		ALI	DAC	Air Water	
			(μCi)	(μCi)	(μCi/ml)		(μCi/ml)	
62	Samarium-145	W, all compounds	6E+3	5E+2	2E-7	7E-10	8E-5	8E-4
62	Samarium-146	W, all compounds	1E+1	4E-2	1E-11	-	-	-
			Bone surf (3E+1)	(6E-2)	Bone surf -	9E-14	3E-7	3E-6
62	Samarium-147	W, all compounds	2E+1	4E-2	2E-11	-	-	-
			Bone surf (3E+1)	(7E-2)	Bone surf -	1E-13	4E-7	4E-6
62	Samarium-151	W, all compounds	1E+4	1E+2	4E-8	-	-	-
			LLI wall (1E+4)	(2E+2)	Bone surf -	2E-10	2E-4	2E-3
62	Samarium-153	W, all compounds	2E+3	3E+3	1E-6	4E-9	-	-
			LLI wall (2E+3)	-	-	-	3E-5	3E-4
62	Samarium-155[2]	W, all compounds	6E+4	2E+5	9E-5	3E-7	-	-
			St wall (8E+4)	-	-	-	1E-3	1E-2
62	Samarium-156	W, all compounds	5E+3	9E+3	4E-6	1E-8	7E-5	7E-4
63	Europium-145	W, all compounds	2E+3	2E+3	8E-7	3E-9	2E-5	2E-4
63	Europium-146	W, all compounds	1E+3	1E+3	5E-7	2E-9	1E-5	1E-4
63	Europium-147	W, all compounds	3E+3	2E+3	7E-7	2E-9	4E-5	4E-4
63	Europium-148	W, all compounds	1E+3	4E+2	1E-7	5E-10	1E-5	1E-4
63	Europium-149	W, all compounds	1E+4	3E+3	1E-6	4E-9	2E-4	2E-3
63	Europium-150 (12.62 hr)	W, all compounds	3E+3	8E+3	4E-6	1E-8	4E-5	4E-4
63	Europium-150 (34.2 years)	W, all compounds	8E+2	2E+1	8E-9	3E-11	1E-5	1E-4
63	Europium-152m	W, all compounds	3E+3	6E+3	3E-6	9E-9	4E-5	4E-4
63	Europium-152	W, all compounds	8E+2	2E+1	1E-8	3E-11	1E-5	1E-4
63	Europium-154	W, all compounds	5E+2	2E+1	8E-9	3E-11	7E-6	7E-5
63	Europium-155	W, all compounds	4E+3	9E+1	4E-8	-	5E-5	5E-4
			-	Bone surf (1E+2)	-	2E-10	-	-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion ALI (μCi)	Col. 2 ALI (μCi)	Col. 3 Inhalation ALI (μCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (μCi/ml)	Water (μCi/ml)	Table III Releases to Sewers Monthly
63	Europium-156	W, all compounds	6E+2	5E+2	2E-7	6E-10	8E-6		8E-5
63	Europium-157	W, all compounds	2E+3	5E+3	2E-6	7E-9	3E-5		3E-4
63	Europium-158[2]	W, all compounds	2E+4	6E+4	2E-5	8E-8	3E-4		3E-3
64	Gadolinium-145[2]	D, all compounds except those given for W	5E+4	2E+5	6E-5	2E-7	-		-
			St wall (5E+4)	-	-	-	6E-4		6E-3
		W, oxides, hydroxides, and fluorides	-	2E+5	7E-5	2E-7	-		-
64	Gadolinium-146	D, see ^{145}Gd	1E+3	1E+2	5E-8	2E-10	2E-5		2E-4
		W, see ^{145}Gd	-	3E+2	1E-7	4E-10	-		-
64	Gadolinium-147	D, see ^{145}Gd	2E+3	4E+3	2E-6	6E-9	3E-5		3E-4
		W, see ^{145}Gd	-	4E+3	1E-6	5E-9	-		-
64	Gadolinium-148	D, see ^{145}Gd	1E+1	8E+3	3E-12	-	-		-
			Bone surf (2E+1)	(2E+2)	Bone surf -	2E-14	3E-7		3E-6
		W, see ^{145}Gd	-	3E-2	1E-11	-	-		-
			-	Bone surf (6E-2)	-	8E-14	-		-
64	Gadolinium-149	D, see ^{145}Gd	3E+3	2E+3	9E-7	3E-9	4E-5		4E-4
		W, see ^{145}Gd	-	2E+3	1E-6	3E-9	-		-
64	Gadolinium-151	D, see ^{145}Gd	6E+3	4E+2	2E-7	-	9E-5		9E-4
			-	Bone surf (6E+2)	-	9E-10	-		-
		W, see ^{145}Gd	-	1E+3	5E-7	2E-9	-		-
64	Gadolinium-152	D, see ^{145}Gd	2E+1	1E-2	4E-12	-	-		-
			Bone surf (3E+1)	(2E-2)	Bone surf -	3E-14	4E-7		4E-6
		W, see ^{145}Gd	-	4E-2	2E-11	-	-		-
			-	Bone surf (8E-2)	-	1E-13	-		-
64	Gadolinium-153	D, see ^{145}Gd	5E+3	1E+2	6E-8	-	6E-5		6E-4
			-	Bone surf (2E+2)	-	3E-10	-		-
		W, see ^{145}Gd	-	6E+2	2E-7	8E-10	-		-
64	Gadolinium-159	D, see ^{145}Gd	3E+3	8E+3	3E-6	1E-8	4E-5		4E-4
		W, see ^{145}Gd	-	6E+3	2E-6	8E-9	-		-
65	Terbium-147[2]	W, all compounds	9E+3	3E+4	1E-5	5E-8	1E-4		1E-3

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion		Inhalation			Monthly
			ALI		ALI	DAC	Air Water	
			(µCi)	(µCi)	(µCi/ml)		(µCi/ml)	
65	Terbium-149	W, all compounds	5E+3	7E+2	3E-7	1E-9	7E-5	7E-4
65	Terbium-150	W, all compounds	5E+3	2E+4	9E-6	3E-8	7E-5	7E-4
65	Terbium-151	W, all compounds	4E+3	9E+3	4E-6	1E-8	5E-5	5E-4
65	Terbium-153	W, all compounds	5E+3	7E+3	3E-6	1E-8	7E-5	7E-4
65	Terbium-154	W, all compounds	2E+3	4E+3	2E-6	6E-9	2E-5	2E-4
65	Terbium-155	W, all compounds	6E+3	8E+3	3E-6	1E-8	8E-5	8E-4
65	Terbium-156m (5.0 hr)	W, all compounds	2E+4	3E+4	1E-5	4E-8	2E-4	2E-3
65	Terbium-156m (24.4 hr)	W, all compounds	7E+3	8E+3	3E-6	1E-8	1E-4	1E-3
65	Terbium-156	W, all compounds	1E+3	1E+3	6E-7	2E-9	1E-5	1E-4
65	Terbium-157	W, all compounds	5E+4	3E+2	1E-7	-	-	-
			LLI wall (5E+4)	(6E+2)	Bone surf -	8E-10	7E-4	7E-3
65	Terbium-158	W, all compounds	1E+3	2E+1	8E-9	3E-11	2E-5	2E-4
65	Terbium-160	W, all compounds	8E+2	2E+2	9E-8	3E-10	1E-5	1E-4
65	Terbium-161	W, all compounds	2E+3	2E+3	7E-7	2E-9	-	-
			LLI wall (2E+3)	-	-	-	3E-5	3E-4
66	Dysprosium-155	W, all compounds	9E+3	3E+4	1E-5	4E-8	1E-4	1E-3
66	Dysprosium-157	W, all compounds	2E+4	6E+4	3E-5	9E-8	3E-4	3E-3
66	Dysprosium-159	W, all compounds	1E+4	2E+3	1E-6	3E-9	2E-4	2E-3
66	Dysprosium-165	W, all compounds	1E+4	5E+4	2E-5	6E-8	2E-4	2E-3
66	Dysprosium-166	W, all compounds	6E+2	7E+2	3E-7	1E-9	-	-
			LLI wall (8E+2)	-	-	-	1E-5	1E-4
67	Holmium-155[2]	W, all compounds	4E+4	2E+5	6E-5	2E-7	6E-4	6E-3
67	Holmium-157[2]	W, all compounds	3E+5	1E+6	6E-4	2E-6	4E-3	4E-2
67	Holmium-159[2]	W, all compounds	2E+5	1E+6	4E-4	1E-6	3E-3	3E-2

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion		Inhalation			Monthly
			ALI		ALI	DAC	Air Water	
			(μCi)	(μCi)	(μCi/ml)		(μCi/ml)	
67	Holmium-161	W, all compounds	1E+5	4E+5	2E-4	6E-7	1E-3	1E-2
67	Holmium-162m[2]	W, all compounds	5E+4	3E+5	1E-4	4E-7	7E-4	7E-3
67	Holmium-162[2]	W, all compounds	5E+5	2E+6	1E-3	3E-6	-	-
			St wall (8E+5)	-	-	-	1E-2	1E-1
67	Holmium-164m[2]	W, all compounds	1E+5	3E+5	1E-4	4E-7	1E-3	1E-2
67	Holmium-164[2]	W, all compounds	2E+5	6E+5	3E-4	9E-7	-	-
			St wall (2E+5)	-	-	-	3E-3	3E-2
67	Holmium-166m	W, all compounds	6E+2	7E+0	3E-9	9E-12	9E-6	9E-5
67	Holmium-166	W, all compounds	9E+2	2E+3	7E-7	2E-9	-	-
			LLI wall (9E+2)	-	-	-	1E-5	1E-4
67	Holmium-167	W, all compounds	2E+4	6E+4	2E-5	8E-8	2E-4	2E-3
68	Erbium-161	W, all compounds	2E+4	6E+4	3E-5	9E-8	2E-4	2E-3
68	Erbium-165	W, all compounds	6E+4	2E+5	8E-5	3E-7	9E-4	9E-3
68	Erbium-169	W, all compounds	3E+3	3E+3	1E-6	4E-9	-	-
			LLI wall (4E+3)	-	-	-	5E-5	5E-4
68	Erbium-171	W, all compounds	4E+3	1E+4	4E-6	1E-8	5E-5	5E-4
68	Erbium-172	W, all compounds	1E+3	1E+3	6E-7	2E-9	-	-
			LLI wall (1E+3)	-	-	-	2E-5	2E-4
69	Thulium-162[2]	W, all compounds	7E+4	3E+5	1E-4	4E-7	-	-
			St wall (7E+4)	-	-	-	1E-3	1E-2
69	Thulium-166	W, all compounds	4E+3	1E+4	6E-6	2E-8	6E-5	6E-4
69	Thulium-167	W, all compounds	2E+3	2E+3	8E-7	3E-9	-	-
			LLI wall (2E+3)	-	-	-	3E-5	3E-4
69	Thulium-170	W, all compounds	8E+2	2E+2	9E-8	3E-10	-	-
			LLI wall (1E+3)	-	-	-	1E-5	1E-4

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI (μCi)	ALI (μCi)	DAC (μCi/ml)	Air	Water (μCi/ml)	
69	Thulium-171	W, all compounds	1E+4	3E+2	1E-7	-	-	-
			LLI wall (1E+4)	(6E+2)	Bone surf -	8E-10	2E-4	2E-3
69	Thulium-172	W, all compounds	7E+2	1E+3	5E-7	2E-9	-	-
			LLI wall (8E+2)	-	-	-	1E-5	1E-4
69	Thulium-173	W, all compounds	4E+3	1E+4	5E-6	2E-8	6E-5	6E-4
69	Thulium-175[2]	W, all compounds	7E+4	3E+5	1E-4	4E-7	-	-
			St wall (9E+4)	-	-	-	1E-3	1E-2
70	Ytterbium-162[2]	W, all compounds except those given for Y	7E+4	3E+5	1E-4	4E-7	1E-3	1E-2
		Y, oxides, hydroxides, and fluorides	-	3E+5	1E-4	4E-7	-	-
70	Ytterbium-166	W, see ^{162}Yb	1E+3	2E+3	8E-7	3E-9	2E-5	2E-4
		Y, see ^{162}Yb	-	2E+3	8E-7	3E-9	-	-
70	Ytterbium-167[2]	W, see ^{162}Yb	3E+5	8E+5	3E-4	1E-6	4E-3	4E-2
		Y, see ^{162}Yb	-	7E+5	3E-4	1E-6	-	-
70	Ytterbium-169	W, see ^{162}Yb	2E+3	8E+2	4E-7	1E-9	2E-5	2E-4
		Y, see ^{162}Yb	-	7E+2	3E-7	1E-9	-	-
70	Ytterbium-175	W, see ^{162}Yb	3E+3	4E+3	1E-6	5E-9	-	-
			LLI wall (3E+3)	-	-	-	4E-5	4E-4
		Y, see ^{162}Yb	-	3E+3	1E-6	5E-9	-	-
70	Ytterbium-177[2]	W, see ^{162}Yb	2E+4	5E+4	2E-5	7E-8	2E-4	2E-3
		Y, see ^{162}Yb	-	5E+4	2E-5	6E-8	-	-
70	Ytterbium-178[2]	W, see ^{162}Yb	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		Y, see ^{162}Yb	-	4E+4	2E-5	5E-8	-	-
71	Lutetium-169	W, all compounds except those given for Y	3E+3	4E+3	2E-6	6E-9	3E-5	3E-4
		Y, oxides, hydroxides, and fluorides	-	4E+3	2E-6	6E-9	-	-
71	Lutetium-170	W, see ^{169}Lu	1E+3	2E+3	9E-7	3E-9	2E-5	2E-4
		Y, see ^{169}Lu	-	2E+3	8E-7	3E-9	-	-
71	Lutetium-171	W, see ^{169}Lu	2E+3	2E+3	8E-7	3E-9	3E-5	3E-4
		Y, see ^{169}Lu	-	2E+3	8E-7	3E-9	-	-

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion		Inhalation			Monthly
				ALI	ALI	DAC	Air	Water
			(µCi)	(µCi)	(µCi/ml)		(µCi/ml)	
71	Lutetium-172	W, see ^{169}Lu	1E+3	1E+3	5E-7	2E-9	1E-5	1E-4
		Y, see ^{169}Lu	-	1E+3	5E-7	2E-9	-	-
71	Lutetium-173	W, see ^{169}Lu	5E+3	3E+2	1E-7	-	7E-5	7E-4
			-	Bone surf (5E+2)	-	6E-10	-	-
		Y, see ^{169}Lu	-	3E+2	1E-7	4E-10	-	-
71	Lutetium-174m	W, see ^{169}Lu	2E+3 LLI wall (3E+3)	2E+2 (3E+2)	1E-7 Bone surf -	- 5E-10	- 4E-5	- 4E-4
		Y, see ^{169}Lu	-	2E+2	9E-8	3E-10	-	-
71	Lutetium-174	W, see ^{169}Lu	5E+3	1E+2	5E-8	-	7E-5	7E-4
			-	Bone surf (2E+2)	-	3E-10	-	-
		Y, see ^{169}Lu	-	2E+2	6E-8	2E-10	-	-
71	Lutetium-176m	W, see ^{169}Lu	8E+3	3E+4	1E-5	3E-8	1E-4	1E-3
		Y, see ^{169}Lu	-	2E+4	9E-6	3E-8	-	-
71	Lutetium-176	W, see ^{169}Lu	7E+2	5E+0	2E-9	-	1E-5	1E-4
			-	Bone surf (1E+1)	-	2E-11	-	-
		Y, see ^{169}Lu	-	8E+0	3E-9	1E-11	-	-
71	Lutetium-177m	W, see ^{169}Lu	7E+2	1E+2	5E-8	-	1E-5	1E-4
			-	Bone surf (1E+2)	-	2E-10	-	-
		Y, see ^{169}Lu	-	8E+1	3E-8	1E-10	-	-
71	Lutetium-177	W, see ^{169}Lu	2E+3 LLI wall (3E+3)	2E+3 -	9E-7 -	3E-9 -	- 4E-5	- 4E-4
		Y, see ^{169}Lu	-	2E+3	9E-7	3E-9	-	-
71	Lutetium-178m[2]	W, see ^{169}Lu	5E+4 St. wall (6E+4)	2E+5 -	8E-5 -	3E-7 -	- 8E-4	- 8E-3
		Y, see ^{169}Lu	-	2E+5	7E-5	2E-7	-	-
71	Lutetium-178[2]	W, see ^{169}Lu	4E+4 St wall (4E+4)	1E+5 -	5E-5 -	2E-7 -	- 6E-4	- 6E-3
		Y, see ^{169}Lu	-	1E+5	5E-5	2E-7	-	-
71	Lutetium-179	W, see ^{169}Lu	6E+3	2E+4	8E-6	3E-8	9E-5	9E-4
		Y, see ^{169}Lu	-	2E+4	6E-6	3E-8	-	-
72	Hafnium-170	D, all compounds except						

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (μCi)	Col. 2 ALI (μCi)	Col. 3 Inhalation ALI (μCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (μCi/ml)	Water (μCi/ml)	Table III Releases to Sewers Monthly
		those given for W	3E+3	6E+3	2E-6	8E-9	4E-5		4E-4
		W, oxides, hydroxides, carbides, and nitrates		-	5E+3	2E-6	6E-9		-
	-								
72	Hafnium-172	D, see ^{170}Hf	1E+3	9E+0	4E-9	-	2E-5		2E-4
				Bone surf					
			-	(2E+1)	-	3E-11	-		-
		W, see ^{170}Hf	-	4E+1	2E-8	-	-		-
				Bone surf					
			-	(6E+1)	-	8E-11	-		-
72	Hafnium-173	D, see ^{170}Hf	5E+3	1E+4	5E-6	2E-8	7E-5		7E-4
		W, see ^{170}Hf	-	1E+4	5E-6	2E-8	-		-
72	Hafnium-175	D, see ^{170}Hf	3E+3	9E+2	4E-7	-	4E-5		4E-4
				Bone surf					
			-	(1E+3)	-	1E-9	-		-
		W, see ^{170}Hf	-	1E+3	5E-7	2E-9	-		-
72	Hafnium-177m[2]	D, see ^{170}Hf	2E+4	6E+4	2E-5	8E-8	3E-4		3E-3
		W, see ^{170}Hf	-	9E+4	4E-5	1E-7	-		-
72	Hafnium-178m	D, see ^{170}Hf	3E+2	1E+0	5E-10	-	3E-6		3E-5
				Bone surf					
			-	(2E+0)	-	3E-12	-		-
		W, see ^{170}Hf	-	5E+0	2E-9	-	-		-
				Bone surf					
			-	(9E+0)	-	1E-11	-		-
72	Hafnium-179m	D, see ^{170}Hf	1E+3	3E+2	1E-7	-	1E-5		1E-4
				Bone surf					
			-	(6E+2)	-	8E-10	-		-
		W, see ^{170}Hf	-	6E+2	3E-7	8E-10	-		-
72	Hafnium-180m	D, see ^{170}Hf	7E+3	2E+4	9E-6	3E-8	1E-4		1E-3
		W, see ^{170}Hf	-	3E+4	1E-5	4E-8	-		-
72	Hafnium-181	D, see ^{170}Hf	1E+3	2E+2	7E-8	-	2E-5		2E-4
				Bone surf					
			-	(4E+2)	-	6E-10	-		-
		W, see ^{170}Hf	-	4E+2	2E-7	6E-10	-		-
72	Hafnium-182m[2]	D, see ^{170}Hf	4E+4	9E+4	4E-5	1E-7	5E-4		5E-3
		W, see ^{170}Hf	-	1E+5	6E-5	2E-7	-		-
72	Hafnium-182	D, see ^{170}Hf	2E+2	8E-1	3E-10	-	-		-
			Bone surf		Bone surf				
			(4E+2)	(2E+0)	-	2E-12	5E-6		5E-5
		W, see ^{170}Hf	-	3E+0	1E-9	-	-		-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			(μCi)	ALI (μCi)	ALI (μCi/ml)	DAC	Air (μCi/ml)	Water (μCi/ml)
			-	Bone surf (7E+0)	-	1E-11	-	-
72	Hafnium-183[2]	D, see ^{170}Hf	2E+4	5E+4	2E-5	6E-8	3E-4	3E-3
		W, see ^{170}Hf	-	6E+4	2E-5	8E-8	-	-
72	Hafnium-184	D, see ^{170}Hf	2E+3	8E+3	3E-6	1E-8	3E-5	3E-4
		W, see ^{170}Hf	-	6E+3	3E-6	9E-9	-	-
73	Tantalum-172[2]	W, all compounds except those given for Y	4E+4	1E+5	5E-5	2E-7	5E-4	5E-3
		Y, elemental Ta, oxides, hydroxides, halides, carbides, nitrates, and nitrides	-	1E+5	4E-5	1E-7	-	-
73	Tantalum-173	W, see ^{172}Ta	7E+3	2E+4	8E-6	3E-8	9E-5	9E-4
		Y, see ^{172}Ta	-	2E+4	7E-6	2E-8	-	-
73	Tantalum-174[2]	W, see ^{172}Ta	3E+4	1E+5	4E-5	1E-7	4E-4	4E-3
		Y, see ^{172}Ta	-	9E+4	4E-5	1E-7	-	-
73	Tantalum-175	W, see ^{172}Ta	6E+3	2E+4	7E-6	2E-8	8E-5	8E-4
		Y, see ^{172}Ta	-	1E+4	6E-6	2E-8	-	-
73	Tantalum-176	W, see ^{172}Ta	4E+3	1E+4	5E-6	2E-8	5E-5	5E-4
		Y, see ^{172}Ta	-	1E+4	5E-6	2E-8	-	-
73	Tantalum-177	W, see ^{172}Ta	1E+4	2E+4	8E-6	3E-8	2E-4	2E-3
		Y, see ^{172}Ta	-	2E+4	7E-6	2E-8	-	-
73	Tantalum-178	W, see ^{172}Ta	2E+4	9E+4	4E-5	1E-7	2E-4	2E-3
		Y, see ^{172}Ta	-	7E+4	3E-5	1E-7	-	-
73	Tantalum-179	W, see ^{172}Ta	2E+4	5E+3	2E-6	8E-9	3E-4	3E-3
		Y, see ^{172}Ta	-	9E+2	4E-7	1E-9	-	-
73	Tantalum-180m	W, see ^{172}Ta	2E+4	7E+4	3E-5	9E-8	3E-4	3E-3
		Y, see ^{172}Ta	-	6E+4	2E-5	8E-8	-	-
73	Tantalum-180	W, see ^{172}Ta	1E+3	4E+2	2E-7	6E-10	2E-5	2E-4
		Y, see ^{172}Ta	-	2E+1	1E-8	3E-11	-	-
73	Tantalum-182m[2]	W, see ^{172}Ta	2E+5	5E+5	2E-4	8E-7	-	-
			St wall (2E+5)	-	-	-	3E-3	3E-2
		Y, see ^{172}Ta	-	4E+5	2E-4	6E-7	-	-
73	Tantalum-182	W, see ^{172}Ta	8E+2	3E+2	1E-7	5E-10	1E-5	1E-4
		Y, see ^{172}Ta	-	1E+2	6E-8	2E-10	-	-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI	ALI	DAC	Air	Water	
			(μCi)	(μCi)	(μCi/ml)	(μCi/ml)		
73	Tantalum-183	W, see ^{172}Ta	9E+2	1E+3	5E-7	2E-9	-	-
			LLI wall (1E+3)	-	-	-	2E-5	2E-4
		Y, see ^{172}Ta	-	1E+3	4E-7	1E-9	-	-
73	Tantalum-184	W, see ^{172}Ta	2E+3	5E+3	2E-6	8E-9	3E-5	3E-4
		Y, see ^{172}Ta	-	5E+3	2E-6	7E-9	-	-
73	Tantalum-185[2]	W, see ^{172}Ta	3E+4	7E+4	3E-5	1E-7	4E-4	4E-3
		Y, see ^{172}Ta	-	6E+4	3E-5	9E-8	-	-
73	Tantalum-186[2]	W, see ^{172}Ta	5E+4	2E+5	1E-4	3E-7	-	-
			St wall (7E+4)	-	-	-	1E-3	1E-2
		Y, see ^{172}Ta	-	2E+5	9E-5	3E-7	-	-
74	Tungsten-176	D, all compounds	1E+4	5E+4	2E-5	7E-8	1E-4	1E-3
74	Tungsten-177	D, all compounds	2E+4	9E+4	4E-5	1E-7	3E-4	3E-3
74	Tungsten-178	D, all compounds	5E+3	2E+4	8E-6	3E-8	7E-5	7E-4
74	Tungsten-179[2]	D, all compounds	5E+5	2E+6	7E-4	2E-6	7E-3	7E-2
74	Tungsten-181	D, all compounds	2E+4	3E+4	1E-5	5E-8	2E-4	2E-3
74	Tungsten-185	D, all compounds	2E+3	7E+3	3E-6	9E-9	-	-
			LLI wall (3E+3)	-	-	-	4E-5	4E-4
74	Tungsten-187	D, all compounds	2E+3	9E+3	4E-6	1E-8	3E-5	3E-4
74	Tungsten-188	D, all compounds	4E+2	1E+3	5E-7	2E-9	-	-
			LLI wall (5E+2)	-	-	-	7E-6	7E-5
75	Rhenium-177[2]	D, all compounds except those given for W	9E+4	3E+5	1E-4	4E-7	-	-
			St wall (1E+5)	-	-	-	2E-3	2E-2
		W, oxides, hydroxides, and nitrates	-	4E+5	1E-4	5E-7	-	-
75	Rhenium-178[2]	D, see ^{177}Re	7E+4	3E+5	1E-4	4E-7	-	-
			St wall (1E+5)	-	-	-	1E-3	1E-2
		W, see ^{177}Re	-	3E+5	1E-4	4E-7	-	-
75	Rhenium-181	D, see ^{177}Re	5E+3	9E+3	4E-6	1E-8	7E-5	7E-4
		W, see ^{177}Re	-	9E+3	4E-6	1E-8	-	-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			(μCi)	ALI (μCi)	ALI (μCi/ml)	DAC	Air Water (μCi/ml)	
75	Rhenium-182 (12.7 hr)	D, see ^{177}Re	7E+3	1E+4	5E-6	2E-8	9E-5	9E-4
		W, see ^{177}Re	-	2E+4	6E-6	2E-8	-	-
75	Rhenium-182 (64.0 hr)	D, see ^{177}Re	1E+3	2E+3	1E-6	3E-9	2E-5	2E-4
		W, see ^{177}Re	-	2E+3	9E-7	3E-9	-	-
75	Rhenium-184m	D, see ^{177}Re	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
		W, see ^{177}Re	-	4E+2	2E-7	6E-10	-	-
75	Rhenium-184	D, see ^{177}Re	2E+3	4E+3	1E-6	5E-9	3E-5	3E-4
		W, see ^{177}Re	-	1E+3	6E-7	2E-9	-	-
75	Rhenium-186m	D, see ^{177}Re	1E+3 St wall (2E+3)	2E+3 St wall (2E+3)	7E-7 -	- 3E-9	- 2E-5	- 2E-4
		W, see ^{177}Re	-	2E+2	6E-8	2E-10	-	-
75	Rhenium-186	D, see ^{177}Re	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
		W, see ^{177}Re	-	2E+3	7E-7	2E-9	-	-
75	Rhenium-187	D, see ^{177}Re	6E+5	8E+5 St wall	4E-4	-	8E-3	8E-2
			-	(9E+5)	-	1E-6	-	-
		W, see ^{177}Re	-	1E+5	4E-5	1E-7	-	-
75	Rhenium-188m[2]	D, see ^{177}Re	8E+4	1E+5	6E-5	2E-7	1E-3	1E-2
		W, see ^{177}Re	-	1E+5	6E-5	2E-7	-	-
75	Rhenium-188	D, see ^{177}Re	2E+3	3E+3	1E-6	4E-9	2E-5	2E-4
		W, see ^{177}Re	-	3E+3	1E-6	4E-9	-	-
75	Rhenium-189	D, see ^{177}Re	3E+3	5E+3	2E-6	7E-9	4E-5	4E-4
		W, see ^{177}Re	-	4E+3	2E-6	6E-9	-	-
76	Osmium-180[2] 1E-2	D, all compounds except those given for W and Y		1E+5	4E+5	2E-4	5E-7	1E-3
		W, halides and nitrates	-	5E+5	2E-4	7E-7	-	-
		Y, oxides and hydroxides	-	5E+5	2E-4	6E-7	-	-
76	Osmium-181[2]	D, see ^{180}Os	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{180}Os	-	5E+4	2E-5	6E-8	-	-
		Y, see ^{180}Os	-	4E+4	2E-5	6E-8	-	-
76	Osmium-182	D, see ^{180}Os	2E+3	6E+3	2E-6	8E-9	3E-5	3E-4
		W, see ^{180}Os	-	4E+3	2E-6	6E-9	-	-
		Y, see ^{180}Os	-	4E+3	2E-6	6E-9	-	-
76	Osmium-185	D, see ^{180}Os	2E+3	5E+2	2E-7	7E-10	3E-5	3E-4
		W, see ^{180}Os	-	8E+2	3E-7	1E-9	-	-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (μCi)	Col. 2 ALI (μCi)	Col. 3 Inhalation ALI (μCi/ml)	Table II Effluent Conc. Col. 1 DAC	Col. 2 Air (μCi/ml)	Water (μCi/ml)	Table III Releases to Sewers Monthly
		Y, see ^{180}Os	-	8E+2	3E-7	1E-9	-		-
76	Osmium-189m	D, see ^{180}Os	8E+4	2E+5	1E-4	3E-7	1E-3		1E-2
		W, see ^{180}Os	-	2E+5	9E-5	3E-7	-		-
		Y, see ^{180}Os	-	2E+5	7E-5	2E-7	-		-
76	Osmium-191m	D, see ^{180}Os	1E+4	3E+4	1E-5	4E-8	2E-4		2E-3
		W, see ^{180}Os	-	2E+4	8E-6	3E-8	-		-
		Y, see ^{180}Os	-	2E+4	7E-6	2E-8	-		-
76	Osmium-191	D, see ^{180}Os	2E+3	2E+3	9E-7	3E-9	-		-
			LLI wall (3E+3)	-	-	-	3E-5		3E-4
		W, see ^{180}Os	-	2E+3	7E-7	2E-9	-		-
		Y, see ^{180}Os	-	1E+3	6E-7	2E-9	-		-
76	Osmium-193	D, see ^{180}Os	2E+3	5E+3	2E-6	6E-9	-		-
			LLI wall (2E+3)	-	-	-	2E-5		2E-4
		W, see ^{180}Os	-	3E+3	1E-6	4E-9	-		-
		Y, see ^{180}Os	-	3E+3	1E-6	4E-9	-		-
76	Osmium-194	D, see ^{180}Os	4E+2	4E+1	2E-8	6E-11	-		-
			LLI wall (6E+2)	-	-	-	8E-6		8E-5
		W, see ^{180}Os	-	6E+1	2E-8	8E-11	-		-
		Y, see ^{180}Os	-	8E+0	3E-9	1E-11	-		-
77	Iridium-182[2] -	D, all compounds except those given for W and Y		4E+4	1E+5	6E-5	2E-7		-
			St wall (4E+4)	-	-	-	6E-4		6E-3
		W, halides, nitrates, and metallic Ir	-	2E+5	6E-5	2E-7	-		-
		Y, oxides and hydroxides	-	1E+5	5E-5	2E-7	-		-
77	Iridium-184	D, see ^{182}Ir	8E+3	2E+4	1E-5	3E-8	1E-4		1E-3
		W, see ^{182}Ir	-	3E+4	1E-5	5E-8	-		-
		Y, see ^{182}Ir	-	3E+4	1E-5	4E-8	-		-
77	Iridium-185	D, see ^{182}Ir	5E+3	1E+4	5E-6	2E-8	7E-5		7E-4
		W, see ^{182}Ir	-	1E+4	5E-6	2E-8	-		-
		Y, see ^{182}Ir	-	1E+4	4E-6	1E-8	-		-
77	Iridium-186	D, see ^{182}Ir	2E+3	8E+3	3E-6	1E-8	3E-5		3E-4
		W, see ^{182}Ir	-	6E+3	3E-6	9E-9	-		-
		Y, see ^{182}Ir	-	6E+3	2E-6	8E-9	-		-
77	Iridium-187	D, see ^{182}Ir	1E+4	3E+4	1E-5	5E-8	1E-4		1E-3

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			(μCi)	ALI (μCi)	ALI (μCi/ml)	DAC	Air (μCi/ml)	Water
		W, see ^{182}Ir	-	3E+4	1E-5	4E-8	-	-
		Y, see ^{182}Ir	-	3E+4	1E-5	4E-8	-	-
77	Iridium-188	D, see ^{182}Ir	2E+3	5E+3	2E-6	6E-9	3E-5	3E-4
		W, see ^{182}Ir	-	4E+3	1E-6	5E-9	-	-
		Y, see ^{182}Ir	-	3E+3	1E-6	5E-9	-	-
77	Iridium-189	D, see ^{182}Ir	5E+3	5E+3	2E-6	7E-9	-	-
			LLI wall (5E+3)	-	-	-	7E-5	7E-4
		W, see ^{182}Ir	-	4E+3	2E-6	5E-9	-	-
		Y, see ^{182}Ir	-	4E+3	1E-6	5E-9	-	-
77	Iridium-190m[2]	D, see ^{182}Ir	2E+5	2E+5	8E-5	3E-7	2E-3	2E-2
		W, see ^{182}Ir	-	2E+5	9E-5	3E-7	-	-
		Y, see ^{182}Ir	-	2E+5	8E-5	3E-7	-	-
77	Iridium-190	D, see ^{182}Ir	1E+3	9E+2	4E-7	1E-9	1E-5	1E-4
		W, see ^{182}Ir	-	1E+3	4E-7	1E-9	-	-
		Y, see ^{182}Ir	-	9E+2	4E-7	1E-9	-	-
77	Iridium-192m	D, see ^{182}Ir	3E+3	9E+1	4E-8	1E-10	4E-5	4E-4
		W, see ^{182}Ir	-	2E+2	9E-8	3E-10	-	-
		Y, see ^{182}Ir	-	2E+1	6E-9	2E-11	-	-
77	Iridium-192	D, see ^{182}Ir	9E+2	3E+2	1E-7	4E-10	1E-5	1E-4
		W, see ^{182}Ir	-	4E+2	2E-7	6E-10	-	-
		Y, see ^{182}Ir	-	2E+2	9E-8	3E-10	-	-
77	Iridium-194m	D, see ^{182}Ir	6E+2	9E+1	4E-8	1E-10	9E-6	9E-5
		W, see ^{182}Ir	-	2E+2	7E-8	2E-10	-	-
		Y, see ^{182}Ir	-	1E+2	4E-8	1E-10	-	-
77	Iridium-194	D, see ^{182}Ir	1E+3	3E+3	1E-6	4E-9	1E-5	1E-4
		W, see ^{182}Ir	-	2E+3	9E-7	3E-9	-	-
		Y, see ^{182}Ir	-	2E+3	8E-7	3E-9	-	-
77	Iridium-195m	D, see ^{182}Ir	8E+3	2E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{182}Ir	-	3E+4	1E-5	4E-8	-	-
		Y, see ^{182}Ir	-	2E+4	9E-6	3E-8	-	-
77	Iridium-195	D, see ^{182}Ir	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{182}Ir	-	5E+4	2E-5	7E-8	-	-
		Y, see ^{182}Ir	-	4E+4	2E-5	6E-8	-	-
78	Platinum-186	D, all compounds	1E+4	4E+4	2E-5	5E-8	2E-4	2E-3
78	Platinum-188	D, all compounds	2E+3	2E+3	7E-7	2E-9	2E-5	2E-4
78	Platinum-189	D, all compounds	1E+4	3E+4	1E-5	4E-8	1E-4	1E-3

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			(μCi)	ALI (μCi)	ALI (μCi/ml)	DAC	Air Water (μCi/ml)	
78	Platinum-191	D, all compounds	4E+3	8E+3	4E-6	1E-8	5E-5	5E-4
78	Platinum-193m	D, all compounds	3E+3	6E+3	3E-6	8E-9	-	-
			LLI wall (3E+4)	-	-	-	4E-5	4E-4
78	Platinum-193	D, all compounds	4E+4	2E+4	1E-5	3E-8	-	-
			LLI wall (5E+4)	-	-	-	6E-4	6E-3
78	Platinum-195m	D, all compounds	2E+3	4E+3	2E-6	6E-9	-	-
			LLI wall (2E+3)	-	-	-	3E-5	3E-4
78	Platinum-197m[2]	D, all compounds	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
78	Platinum-197	D, all compounds	3E+3	1E+4	4E-6	1E-8	4E-5	4E-4
78	Platinum-199[2]	D, all compounds	5E+4	1E+5	6E-5	2E-7	7E-4	7E-3
78	Platinum-200	D, all compounds	1E+3	3E+3	1E-6	5E-9	2E-5	2E-4
79	Gold-193	D, all compounds except those given for W and Y		9E+3	3E+4	1E-5	4E-8	1E-4
	1E-3							
		W, halides and nitrates	-	2E+4	9E-6	3E-8	-	-
		Y, oxides and hydroxides	-	2E+4	8E-6	3E-8	-	-
79	Gold-194	D, see ^{193}Au	3E+3	8E+3	3E-6	1E-8	4E-5	4E-4
		W, see ^{193}Au	-	5E+3	2E-6	8E-9	-	-
		Y, see ^{193}Au	-	5E+3	2E-6	7E-9	-	-
79	Gold-195	D, see ^{193}Au	5E+3	1E+4	5E-6	2E-8	7E-5	7E-4
		W, see ^{193}Au	-	1E+3	6E-7	2E-9	-	-
		Y, see ^{193}Au	-	4E+2	2E-7	6E-10	-	-
79	Gold-198m	D, see ^{193}Au	1E+3	3E+3	1E-6	4E-9	1E-5	1E-4
		W, see ^{193}Au	-	1E+3	5E-7	2E-9	-	-
		Y, see ^{193}Au	-	1E+3	5E-7	2E-9	-	-
79	Gold-198	D, see ^{193}Au	1E+3	4E+3	2E-6	5E-9	2E-5	2E-4
		W, see ^{193}Au	-	2E+3	8E-7	3E-9	-	-
		Y, see ^{193}Au	-	2E+3	7E-7	2E-9	-	-
79	Gold-199	D, see ^{193}Au	3E+3	9E+3	4E-6	1E-8	-	-
			LLI wall (3E+3)	-	-	-	4E-5	4E-4
		W, see ^{193}Au	-	4E+3	2E-6	6E-9	-	-
		Y, see ^{193}Au	-	4E+3	2E-6	5E-9	-	-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI	ALI	DAC	Air	Water	
			(μCi)	(μCi)	(μCi/ml)	(μCi/ml)		
79	Gold-200m	D, see ^{193}Au	1E+3	4E+3	1E-6	5E-9	2E-5	2E-4
		W, see ^{193}Au	-	3E+3	1E-6	4E-9	-	-
		Y, see ^{193}Au	-	2E+4	1E-6	3E-9	-	-
79	Gold-200[2]	D, see ^{193}Au	3E+4	6E+4	3E-5	9E-8	4E-4	4E-3
		W, see ^{193}Au	-	8E+4	3E-5	1E-7	-	-
		Y, see ^{193}Au	-	7E+4	3E-5	1E-7	-	-
79	Gold-201[2]	D, see ^{193}Au	7E+4	2E+5	9E-5	3E-7	-	-
			St wall (9E+4)	-	-	-	1E-3	1E-2
		W, see ^{193}Au	-	2E+5	1E-4	3E-7	-	-
		Y, see ^{193}Au	-	2E+5	9E-5	3E-7	-	-
80	Mercury-193m	Vapor	-	8E+3	4E-6	1E-8	-	-
		Organic D	4E+3	1E+4	5E-6	2E-8	6E-5	6E-4
		D, sulfates	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		W, oxides, hydroxides, halides, nitrates, and sulfides	-	8E+3	3E-6	1E-8	-	-
80	Mercury-193	Vapor	-	3E+4	1E-5	4E-8	-	-
		Organic D	2E+4	6E+4	3E-5	9E-8	3E-4	3E-3
		D, see ^{193m}Hg	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{193m}Hg	-	4E+4	2E-5	6E-8	-	-
80	Mercury-194	Vapor	-	3E+1	1E-8	4E-11	-	-
		Organic D	2E+1	3E+1	1E-8	4E-11	2E-7	2E-6
		D, see ^{193m}Hg	8E+2	4E+1	2E-8	6E-11	1E-5	1E-4
		W, see ^{193m}Hg	-	1E+2	5E-8	2E-10	-	-
80	Mercury-195m	Vapor	-	4E+3	2E-6	6E-9	-	-
		Organic D	3E+3	6E+3	3E-6	8E-9	4E-5	4E-4
		D, see ^{193m}Hg	2E+3	5E+3	2E-6	7E-9	3E-5	3E-4
		W, see ^{193m}Hg	-	4E+3	2E-6	5E-9	-	-
80	Mercury-195	Vapor	-	3E+4	1E-5	4E-8	-	-
		Organic D	2E+4	5E+4	2E-5	6E-8	2E-4	2E-3
		D, see ^{193m}Hg	1E+4	4E+4	1E-5	5E-8	2E-4	2E-3
		W, see ^{193m}Hg	-	3E+4	1E-5	5E-8	-	-
80	Mercury-197m	Vapor	-	5E+3	2E-6	7E-9	-	-
		Organic D	4E+3	9E+3	4E-6	1E-8	5E-5	5E-4
		D, see ^{193m}Hg	3E+3	7E+3	3E-6	1E-8	4E-5	4E-4
		W, see ^{193m}Hg	-	5E+3	2E-6	7E-9	-	-
80	Mercury-197	Vapor	-	8E+3	4E-6	1E-8	-	-
		Organic D	7E+3	1E+4	6E-6	2E-8	9E-5	9E-4
		D, see ^{193m}Hg	6E+3	1E+4	5E-6	2E-8	8E-5	8E-4
		W, see ^{193m}Hg	-	9E+3	4E-6	1E-8	-	-

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (µCi)	Col. 2 ALI (µCi)	Col. 3 Inhalation ALI (µCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Col. 2 Air (µCi/ml)	Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly
80	Mercury-199m[2]	Vapor	-	8E+4	3E-5	1E-7	-		-
		Organic D	6E+4	2E+5	7E-5	2E-7	-		-
			St wall (1E+5)	-	-	-	1E-3		1E-2
		D, see ^{193m}Hg	6E+4	1E+5	6E-5	2E-7	8E-4		8E-3
		W, see ^{193m}Hg	-	2E+5	7E-5	2E-7	-		-
80	Mercury-203	Vapor	-	8E+2	4E-7	1E-9	-		-
		Organic D	5E+2	8E+2	3E-7	1E-9	7E-6		7E-5
		D, see ^{193m}Hg	2E+3	1E+3	5E-7	2E-9	3E-5		3E-4
		W, see ^{193m}Hg	-	1E+3	5E-7	2E-9	-		-
81	Thallium-194m[2]	D, all compounds	5E+4	2E+5	6E-5	2E-7	-		-
			St wall (7E+4)	-	-	-	1E-3		1E-2
81	Thallium-194[2]	D, all compounds	3E+5	6E+5	2E-4	8E-7	-		-
			St wall (3E+5)	-	-	-	4E-3		4E-2
81	Thallium-195[2]	D, all compounds	6E+4	1E+5	5E-5	2E-7	9E-4		9E-3
81	Thallium-197	D, all compounds	7E+4	1E+5	5E-5	2E-7	1E-3		1E-2
81	Thallium-198m[2]	D, all compounds	3E+4	5E+4	2E-5	8E-8	4E-4		4E-3
81	Thallium-198	D, all compounds	2E+4	3E+4	1E-5	5E-8	3E-4		3E-3
81	Thallium-199	D, all compounds	6E+4	8E+4	4E-5	1E-7	9E-4		9E-3
81	Thallium-200	D, all compounds	8E+3	1E+4	5E-6	2E-8	1E-4		1E-3
81	Thallium-201	D, all compounds	2E+4	2E+4	9E-6	3E-8	2E-4		2E-3
81	Thallium-202	D, all compounds	4E+3	5E+3	2E-6	7E-9	5E-5		5E-4
81	Thallium-204	D, all compounds	2E+3	2E+3	9E-7	3E-9	2E-5		2E-4
82	Lead-195m[2]	D, all compounds	6E+4	2E+5	8E-5	3E-7	8E-4		8E-3
82	Lead-198	D, all compounds	3E+4	6E+4	3E-5	9E-8	4E-4		4E-3
82	Lead-199[2]	D, all compounds	2E+4	7E+4	3E-5	1E-7	3E-4		3E-3
82	Lead-200	D, all compounds	3E+3	6E+3	3E-6	9E-9	4E-5		4E-4
82	Lead-201	D, all compounds	7E+3	2E+4	8E-6	3E-8	1E-4		1E-3
82	Lead-202m	D, all compounds	9E+3	3E+4	1E-5	4E-8	1E-4		1E-3

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Col. 2 Oral Ingestion ALI (µCi)	Col. 3 Inhalation ALI (µCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC (µCi/ml)	Col. 2 Air (µCi/ml)	Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly
82	Lead-202	D, all compounds	1E+2	5E+1	2E-8	7E-11	2E-6		2E-5
82	Lead-203	D, all compounds	5E+3	9E+3	4E-6	1E-8	7E-5		7E-4
82	Lead-205	D, all compounds	4E+3	1E+3	6E-7	2E-9	5E-5		5E-4
82	Lead-209	D, all compounds	2E+4	6E+4	2E-5	8E-8	3E-4		3E-3
82	Lead-210	D, all compounds	6E-1 Bone surf (1E+0)	2E-1 (4E-1)	1E-10 Bone surf -	- 6E-13	- 1E-8		- 1E-7
82	Lead-211[2]	D, all compounds	1E+4	6E+2	3E-7	9E-10	2E-4		2E-3
82	Lead-212	D, all compounds	8E+1 Bone surf (1E+2)	3E+1 -	1E-8 -	5E-11 -	- 2E-6		- 2E-5
82	Lead-214[2]	D, all compounds	9E+3	8E+2	3E-7	1E-9	1E-4		1E-3
83	Bismuth-200[2]	D, nitrates W, all other compounds	3E+4 -	8E+4 1E+5	4E-5 4E-5	1E-7 1E-7	4E-4 -		4E-3 -
83	Bismuth-201[2]	D, see ^{200}Bi W, see ^{200}Bi	1E+4 -	3E+4 4E+4	1E-5 2E-5	4E-8 5E-8	2E-4 -		2E-3 -
83	Bismuth-202[2]	D, see ^{200}Bi W, see ^{200}Bi	1E+4 -	4E+4 8E+4	2E-5 3E-5	6E-8 1E-7	2E-4 -		2E-3 -
83	Bismuth-203	D, see ^{200}Bi W, see ^{200}Bi	2E+3 -	7E+3 6E+3	3E-6 3E-6	9E-9 9E-9	3E-5 -		3E-4 -
83	Bismuth-205	D, see ^{200}Bi W, see ^{200}Bi	1E+3 -	3E+3 1E+3	1E-6 5E-7	3E-9 2E-9	2E-5 -		2E-4 -
83	Bismuth-206	D, see ^{200}Bi W, see ^{200}Bi	6E+2 -	1E+3 9E+2	6E-7 4E-7	2E-9 1E-9	9E-6 -		9E-5 -
83	Bismuth-207	D, see ^{200}Bi W, see ^{200}Bi	1E+3 -	2E+3 4E+2	7E-7 1E-7	2E-9 5E-10	1E-5 -		1E-4 -
83	Bismuth-210m	D, see ^{200}Bi W, see ^{200}Bi	4E+1 Kidneys (6E+1) -	5E+0 Kidneys (6E+0) 7E-1	2E-9 - 3E-10	- 9E-12 9E-13	- 8E-7 -		- 8E-6 -
83	Bismuth-210	D, see ^{200}Bi W, see ^{200}Bi	8E+2 - - -	2E+2 Kidneys (4E+2) 3E+1	1E-7 - - 1E-8	- 5E-10 4E-11	1E-5 - -		1E-4 - -

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			(µCi)	ALI (µCi)	ALI (µCi/ml)	DAC	Air / Water (µCi/ml)	
83	Bismuth-212[2]	D, see ^{200}Bi	5E+3	2E+2	1E-7	3E-10	7E-5	7E-4
		W, see ^{200}Bi	-	3E+2	1E-7	4E-10	-	-
83	Bismuth-213[2]	D, see ^{200}Bi	7E+3	3E+2	1E-7	4E-10	1E-4	1E-3
		W, see ^{200}Bi	-	4E+2	1E-7	5E-10	-	-
83	Bismuth-214[2]	D, see ^{200}Bi	2E+4	8E+2	3E-7	1E-9	-	-
			St wall (2E+4)	-	-	-	3E-4	3E-3
		W, see ^{200}Bi	-	9E-2	4E-7	1E-9	-	-
84	Polonium-203[2]	D, all compounds except those given for W	3E+4	6E+4	3E-5	9E-8	3E-4	3E-3
		W, oxides, hydroxides, and nitrates	-	9E+4	4E-5	1E-7	-	-
84	Polonium-205[2]	D, see ^{203}Po	2E+4	4E+4	2E-5	5E-8	3E-4	3E-3
		W, see ^{203}Po	-	7E+4	3E-5	1E-7	-	-
84	Polonium-207	D, see ^{203}Po	8E+3	3E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{203}Po	-	3E+4	1E-5	4E-8	-	-
84	Polonium-210	D, see ^{203}Po	3E+0	6E-1	3E-10	9E-13	4E-8	4E-7
		W, see ^{203}Po	-	6E-1	3E-10	9E-13	-	-
85	Astatine-207[2]	D, halides	6E+3	3E+3	1E-6	4E-9	8E-5	8E-4
		W	-	2E+3	9E-7	3E-9	-	-
85	Astatine-211	D, halides	1E+2	8E+1	3E-8	1E-10	2E-6	2E-5
		W	-	5E+1	2E-8	8E-11	-	-
86	Radon-220	With daughters removed	-	2E+4	7E-6	2E-8	-	-
		With daughters present	-	2E+1 (or 12 working level months)	9E-9	3E-11 (or 1.0 working level)	-	-
86	Radon-222	With daughters removed	-	1E+4	4E-6	1E-8	-	-
		With daughters present	-	1E+2 (or 4 working level months)	3E-8	1E-10 (or 0.33 working level)	-	-
87	Francium-222[2]	D, all compounds	2E+3	5E+2	2E-7	6E-10	3E-5	3E-4
87	Francium-223[2]	D, all compounds	6E+2	8E+2	3E-7	1E-9	8E-6	8E-5
88	Radium-223	W, all compounds	5E+0	7E-1	3E-10	9E-13	-	-
			Bone surf (9E+0)	-	-	-	1E-7	1E-6

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion		Inhalation			Monthly
			ALI		ALI	DAC	Air Water	
			(μCi)	(μCi)	(μCi/ml)		(μCi/ml)	
88	Radium-224	W, all compounds	8E+0	2E+0	7E-10	2E-12	-	-
			Bone surf					
			(2E+1)	-	-	-	2E-7	2E-6
88	Radium-225	W, all compounds	8E+0	7E-1	3E-10	9E-13	-	-
			Bone surf					
			(2E+1)	-	-	-	2E-7	2E-6
88	Radium-226	W, all compounds	2E+0	6E-1	3E-10	9E-13	-	-
			Bone surf					
			(5E+0)	-	-	-	6E-8	6E-7
88	Radium-227[2]	W, all compounds	2E+4	1E+4	6E-6	-	-	-
			Bone surf		Bone surf			
			(2E+4)	(2E+4)	-	3E-8	3E-4	3E-3
88	Radium-228	W, all compounds	2E+0	1E+0	5E-10	2E-12	-	-
			Bone surf					
			(4E+0)	-	-	-	6E-8	6E-7
89	Actinium-224	D, all compounds except those given for W and Y		2E+3	3E+1	1E-8	-	-
	-		LLI wall		Bone surf			
			(2E+3)	(4E+1)	-	5E-11	3E-5	3E-4
		W, halides and nitrates	-	5E+1	2E-8	7E-11	-	-
		Y, oxides and hydroxides	-	5E+1	2E-8	6E-11	-	-
89	Actinium-225	D, see ^{224}Ac	5E+1	3E-1	1E-10	-	-	-
			LLI wall		Bone surf			
			(5E+1)	(5E-1)	-	7E-13	7E-7	7E-6
		W, see ^{224}Ac	-	6E-1	3E-10	9E-13	-	-
		Y, see ^{224}Ac	-	6E-1	3E-10	9E-13	-	-
89	Actinium-226	D, see ^{224}Ac	1E+2	3E+0	1E-9	-	-	-
			LLI wall		Bone surf			
			(1E+2)	(4E+0)	-	5E-12	2E-6	2E-5
		W, see ^{224}Ac	-	5E+0	2E-9	7E-12	-	-
		Y, see ^{224}Ac	-	5E+0	2E-9	6E-12	-	-
89	Actinium-227	D, see ^{224}Ac	2E-1	4E-4	2E-13	-	-	-
			Bone surf		Bone surf			
			(4E-1)	(8E-4)	-	1E-15	5E-9	5E-8
		W, see ^{224}Ac	-	2E-3	7E-13	-	-	-
				Bone surf				
			-	(3E-3)	-	4E-15	-	-
		Y, see ^{224}Ac	-	4E-3	2E-12	6E-15	-	-
89	Actinium-228	D, see ^{224}Ac	2E+3	9E+0	4E-9	-	3E-5	3E-4
				Bone surf				

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI	ALI	DAC	Air	Water	
			(µCi)	(µCi)	(µCi/ml)	(µCi/ml)		
			-	(2E+1)	-	2E-11	-	-
		W, see ^{224}Ac	-	4E+1	2E-8	-	-	-
				Bone surf				
			-	(6E+1)	-	8E-11	-	-
		Y, see ^{224}Ac	-	4E+1	2E-8	6E-11	-	-
90	Thorium-226[2]	W, all compounds except those given for Y	5E+3	2E+2	6E-8	2E-10	-	-
			St wall					
			(5E+3)	-	-	-	7E-5	7E-4
		Y, oxides and hydroxides	-	1E+2	6E-8	2E-10	-	-
90	Thorium-227	W, see ^{226}Th	1E+2	3E-1	1E-10	5E-13	2E-6	2E-5
		Y, see ^{226}Th	-	3E-1	1E-10	5E-13	-	-
90	Thorium-228	W, see ^{226}Th	6E+0	1E-2	4E-12	-	-	-
			Bone surf		Bone surf			
			(1E+1)	(2E-2)	-	3E-14	2E-7	2E-6
		Y, see ^{226}Th	-	2E-2	7E-12	2E-14	-	-
90	Thorium-229	W, see ^{226}Th	6E-1	9E-4	4E-13	-	-	-
			Bone surf		Bone surf			
			(1E+0)	(2E-3)	-	3E-15	2E-8	2E-7
		Y, see ^{226}Th	-	2E-3	1E-12	-	-	-
				Bone surf				
			-	(3E-3)	-	4E-15	-	-
90	Thorium-230	W, see ^{226}Th	4E+0	6E-3	3E-12	-	-	-
			Bone surf		Bone surf			
			(9E+0)	(2E-2)	-	2E-14	1E-7	1E-6
		Y, see ^{226}Th	-	2E-2	6E-12	-	-	-
				Bone surf				
			-	(2E-2)	-	3E-14	-	-
90	Thorium-231	W, see ^{226}Th	4E+3	6E+3	3E-6	9E-9	5E-5	5E-4
		Y, see ^{226}Th	-	6E+3	3E-6	9E-9	-	-
90	Thorium-232	W, see ^{226}Th	7E-1	1E-3	5E-13	-	-	-
			Bone surf		Bone surf			
			(2E+0)	(3E-3)	-	4E-15	3E-8	3E-7
		Y, see ^{226}Th	-	3E-3	1E-12	-	-	-
				Bone surf				
			-	(4E-3)	-	6E-15	-	-
90	Thorium-234	W, see ^{226}Th	3E+2	2E+2	8E-8	3E-10	-	-
			LLI wall					
			(4E+2)	-	-	-	5E-6	5E-5
		Y, see ^{226}Th	-	2E+2	6E-8	2E-10	-	-
91	Protactinium-227[2]	W, all compounds except						

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (µCi)	Table I Occupational Values Col. 2 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 3 Inhalation ALI (µCi/ml)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Conc. Col. 1 Air (µCi/ml)	Table II Effluent Conc. Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly
		those given for Y	4E+3	1E+2	5E-8	2E-10	5E-5	5E-4	
		Y, oxides and hydroxides	-	1E+2	4E-8	1E-10	-	-	
91	Protactinium-228	W, see ^{227}Pa	1E+3	1E+1	5E-9	-	2E-5	2E-4	
				Bone surf					
			-	(2E+1)	-	3E-11	-	-	
		Y, see ^{227}Pa	-	1E+1	5E-9	2E-11	-	-	
91	Protactinium-230	W, see ^{227}Pa	6E+2	5E+0	2E-9	7E-12	-	-	
			Bone surf						
			(9E+2)	-	-	-	1E-5	1E-4	
		Y, see ^{227}Pa	-	4E+0	1E-9	5E-12	-	-	
91	Protactinium-231	W, see ^{227}Pa	2E-1	2E-3	6E-13	-	-	-	
			Bone surf		Bone surf				
			(5E-1)	(4E-3)	-	6E-15	6E-9	6E-8	
		Y, see ^{227}Pa	-	4E-3	2E-12	-	-	-	
				Bone surf					
			-	(6E-3)	-	8E-15	-	-	
91	Protactinium-232	W, see ^{227}Pa	1E+3	2E+1	9E-9	-	2E-5	2E-4	
				Bone surf					
			-	(6E+1)	-	8E-11	-	-	
		Y, see ^{227}Pa	-	6E+1	2E-8	-	-	-	
				Bone surf					
			-	(7E+1)	-	1E-10	-	-	
91	Protactinium-233	W, see ^{227}Pa	1E+3	7E+2	3E-7	1E-9	-	-	
			LLI wall						
			(2E+3)	-	-	-	2E-5	2E-4	
		Y, see ^{227}Pa	-	6E+2	2E-7	8E-10	-	-	
91	Protactinium-234	W, see ^{227}Pa	2E+3	8E+3	3E-6	1E-8	3E-5	3E-4	
		Y, see ^{227}Pa	-	7E+3	3E-6	9E-9	-	-	
92	Uranium-230	D, UF_6, UO_2F_2, $UO_2(NO_3)_2$	4E+0	4E-1	2E-10	-	-	-	
			Bone surf		Bone surf				
			(6E+0)	(6E-1)	-	8E-13	8E-8	8E-7	
		W, UO_3, UF_4, UCl_4	-	4E-1	1E-10	5E-13	-	-	
		Y, UO_2, U_3O_8	-	3E-1	1E-10	4E-13	-	-	
92	Uranium-231	D, see ^{230}U	5E+3	8E+3	3E-6	1E-8	-	-	
				LLI wall					
			(4E+3)	-	-	-	6E-5	6E-4	
		W, see ^{230}U	-	6E+3	2E-6	8E-9	-	-	
		Y, see ^{230}U	-	5E+3	2E-6	6E-9	-	-	
92	Uranium-232	D, see ^{230}U	2E+0	2E-1	9E-11	-	-	-	
			Bone surf		Bone surf				
			(4E+0)	(4E-1)	-	6E-13	6E-8	6E-7	

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation			Monthly
			ALI		ALI	DAC	Air	Water
			(μCi)	(μCi)	(μCi/ml)		(μCi/ml)	
		W, see ^{230}U	-	4E-1	2E-10	5E-13	-	-
		Y, see ^{230}U	-	8E-3	3E-12	1E-14	-	-
92	Uranium-233	D, see ^{230}U	1E+1	1E+0	5E-10	-	-	-
			Bone surf (2E+1)	(2E+0)	Bone surf -	3E-12	3E-7	3E-6
		W, see ^{230}U	-	7E-1	3E-10	1E-12	-	-
		Y, see ^{230}U	-	4E-2	2E-11	5E-14	-	-
92	Uranium-234[3]	D, see ^{230}U	1E+1	1E+0	5E-10	-	-	-
			Bone surf (2E+1)	(2E+0)	Bone surf -	3E-12	3E-7	3E-6
		W, see ^{230}U	-	7E-1	3E-10	1E-12	-	-
		Y, see ^{230}U	-	4E-2	2E-11	5E-14	-	-
92	Uranium-235[3]	D, see ^{230}U	1E+1	1E+0	6E-10	-	-	-
			Bone surf (2E+1)	(2E+0)	Bone surf -	3E-12	3E-7	3E-6
		W, see ^{230}U	-	8E-1	3E-10	1E-12	-	-
		Y, see ^{230}U	-	4E-2	2E-11	6E-14	-	-
92	Uranium-236	D, see ^{230}U	1E+1	1E+0	5E-10	-	-	-
			Bone surf (2E+1)	(2E+0)	Bone surf -	3E-12	3E-7	3E-6
		W, see ^{230}U	-	8E-1	3E-10	1E-12	-	-
		Y, see ^{230}U	-	4E-2	2E-11	6E-14	-	-
92	Uranium-237	D, see ^{230}U	2E+3	3E+3	1E-6	4E-9	-	-
			LLI wall (2E+3)	-	-	-	3E-5	3E-4
		W, see ^{230}U	-	2E+3	7E-7	2E-9	-	-
		Y, see ^{230}U	-	2E+3	6E-7	2E-9	-	-
92	Uranium-238[3]	D, see ^{230}U	1E+1	1E+0	6E-10	-	-	-
			Bone surf (2E+1)	(2E+0)	Bone surf -	3E-12	3E-7	3E-6
		W, see ^{230}U	-	8E-1	3E-10	1E-12	-	-
		Y, see ^{230}U	-	4E-2	2E-11	6E-14	-	-
92	Uranium-239[2]	D, see ^{230}U	7E+4	2E+5	8E-5	3E-7	9E-4	9E-3
		W, see ^{230}U	-	2E+5	7E-5	2E-7	-	-
		Y, see ^{230}U	-	2E+5	6E-5	2E-7	-	-
92	Uranium-240	D, see ^{230}U	1E+3	4E+3	2E-6	5E-9	2E-5	2E-4
		W, see ^{230}U	-	3E+3	1E-6	4E-9	-	-
		Y, see ^{230}U	-	2E+3	1E-6	3E-9	-	-
92	Uranium-natural[3]	D, see ^{230}U	1E+1	1E+0	5E-10	-	-	-
			Bone surf (2E+1)	(2E+0)	Bone surf -	3E-12	3E-7	3E-6

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI	ALI	DAC	Air	Water	
			(μCi)	(μCi)	(μCi/ml)	(μCi/ml)		
		W, see ^{230}U	-	8E-1	3E-10	9E-13	-	-
		Y, see ^{230}U	-	5E-2	2E-11	9E-14	-	-
93	Neptunium-232[2]	W, all compounds	1E+5	2E+3	7E-7	-	2E-3	2E-2
				Bone surf				
			-	(5E+2)	-	6E-9	-	-
93	Neptunium-233[2]	W, all compounds	8E+5	3E+6	1E-3	4E-6	1E-2	1E-1
93	Neptunium-234	W, all compounds	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
93	Neptunium-235	W, all compounds	2E+4	8E+2	3E-7	-	-	-
			LLI wall		Bone surf			
			(2E+4)	(1E+3)	-	2E-9	3E-4	3E-3
93	Neptunium-236 (1.15E+5 years)	W, all compounds	3E+0	2E-2	9E-12	-	-	-
			Bone surf		Bone surf			
			(6E+0)	(5E-2)	-	8E-14	9E-8	9E-7
93	Neptunium-236 (22.5 hr)	W, all compounds	3E+3	3E+1	1E-8	-	-	-
			Bone surf		Bone surf			
			(4E+3)	(7E+1)	-	1E-10	5E-5	5E-4
93	Neptunium-237	W, all compounds	5E-1	4E-3	2E-12	-	-	-
			Bone surf		Bone surf			
			(1E+0)	(1E-2)	-	1E-14	2E-8	2E-7
93	Neptunium-238	W, all compounds	1E+3	6E+1	3E-8	-	2E-5	2E-4
				Bone surf				
			-	(2E+2)	-	2E-10	-	-
93	Neptunium-239	W, all compounds	2E+3	2E+3	9E-7	3E-9	-	-
			LLI wall					
			(2E+3)	-	-	-	2E-5	2E-4
93	Neptunium-240[2]	W, all compounds	2E+4	8E+4	3E-5	1E-7	3E-4	3E-3
94	Plutonium-234	W, all compounds except PuO_2	8E+3	2E+2	9E-8	3E-10	1E-4	1E-3
		Y, PuO_2	-	2E+2	8E-8	3E-10	-	-
94	Plutonium-235[2]	W, see ^{234}Pu	9E+5	3E+6	1E-3	4E-6	1E-2	1E-1
		Y, see ^{234}Pu	-	3E+6	1E-3	3E-6	-	-
94	Plutonium-236	W, see ^{234}Pu	2E+0	2E-2	8E-12	-	-	-
			Bone surf		Bone surf			
			(4E+0)	(4E-2)	-	5E-14	6E-8	6E-7
		Y, see ^{234}Pu	-	4E-2	2E-11	6E-14	-	-
94	Plutonium-237	W, see ^{234}Pu	1E+4	3E+3	1E-6	5E-9	2E-4	2E-3
		Y, see ^{234}Pu	-	3E+3	1E-6	4E-9	-	-

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation	Col. 1	Col. 2	Monthly
			ALI	ALI	DAC	Air	Water	
			(μCi)	(μCi)	(μCi/ml)	(μCi/ml)		
94	Plutonium-238	W, see ^{234}Pu	9E-1	7E-3	3E-12	-	-	-
			Bone surf		Bone surf			
			(2E+0)	(1E-2)	-	2E-14	2E-8	2E-7
		Y, see ^{234}Pu	-	2E-2	8E-12	2E-14	-	-
94	Plutonium-239	W, see ^{234}Pu	8E-1	6E-3	3E-12	-	-	-
			Bone surf		Bone surf			
			(1E+0)	(1E-2)	-	2E-14	2E-8	2E-7
		Y, see ^{234}Pu	-	2E-2	7E-12	-	-	-
				Bone surf				
			-	(2E-2)	-	2E-14	-	-
94	Plutonium-240	W, see ^{234}Pu	8E-1	6E-3	3E-12	-	-	-
			Bone surf		Bone surf			
			(1E+0)	(1E-2)	-	2E-14	2E-8	2E-7
		Y, see ^{234}Pu	-	2E-2	7E-12	-	-	-
				Bone surf				
			-	(2E-2)	-	2E-14	-	-
94	Plutonium-241	W, see ^{234}Pu	4E+1	3E-1	1E-10	-	-	-
			Bone surf		Bone surf			
			(7E+1)	(6E-1)	-	8E-13	1E-6	1E-5
		Y, see ^{234}Pu	-	8E-1	3E-10	-	-	-
				Bone surf				
			-	(1E+0)	-	1E-12	-	-
94	Plutonium-242	W, see ^{234}Pu	8E-1	7E-3	3E-12	-	-	-
			Bone surf		Bone surf			
			(1E+0)	(1E-2)	-	2E-14	2E-8	2E-7
		Y, see ^{234}Pu	-	2E-2	7E-12	-	-	-
				Bone surf				
			-	(2E-2)	-	2E-14	-	-
94	Plutonium-243	W, see ^{234}Pu	2E+4	4E+4	2E-5	5E-8	2E-4	2E-3
		Y, see ^{234}Pu	-	4E+4	2E-5	5E-8	-	-
94	Plutonium-244	W, see ^{234}Pu	8E-1	7E-3	3E-12	-	-	-
			Bone surf		Bone surf			
			(2E+0)	(1E-2)	-	2E-14	2E-8	2E-7
		Y, see ^{234}Pu	-	2E-2	7E-12	-	-	-
				Bone surf				
			-	(2E-2)	-	2E-14	-	-
94	Plutonium-245	W, see ^{234}Pu	2E+3	5E+3	2E-6	6E-9	3E-5	3E-4
		Y, see ^{234}Pu	-	4E+3	2E-6	6E-9	-	-
94	Plutonium-246	W, see ^{234}Pu	4E+2	3E+2	1E-7	4E-10	-	-
			LLI wall					
			(4E+2)	-	-	-	6E-6	6E-5
		Y, see ^{234}Pu	-	3E+2	1E-7	4E-10	-	-

Atomic No.	Radionuclide (µCi/ml)	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion		Inhalation			Monthly
			ALI		ALI	DAC	Air Water	
			(µCi)	(µCi)	(µCi/ml)		(µCi/ml)	
95	Americium-237[2]	W, all compounds	8E+4	3E+5	1E-4	4E-7	1E-3	1E-2
95	Americium-238[2]	W, all compounds	4E+4	3E+3	1E-6	-	5E-4	5E-3
			-	Bone surf (6E+3)	-	9E-9	-	-
95	Americium-239	W, all compounds	5E+3	1E+4	5E-6	2E-8	7E-5	7E-4
95	Americium-240	W, all compounds	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
95	Americium-241	W, all compounds	8E-1	6E-3	3E-12	-	-	-
			Bone surf (1E+0)	(1E-2)	Bone surf -	2E-14	2E-8	2E-7
95	Americium-242m	W, all compounds	8E-1	6E-3	3E-12	-	-	-
			Bone surf (1E+0)	(1E-2)	Bone surf -	2E-14	2E-8	2E-7
95	Americium-242	W, all compounds	4E+3	8E+1	4E-8	-	5E-5	5E-4
			-	Bone surf (9E+1)	-	1E-10	-	-
95	Americium-243	W, all compounds	8E-1	6E-3	3E-12	-	-	-
			Bone surf (1E+0)	(1E-2)	Bone surf -	2E-14	2E-8	2E-7
95	Americium-244m[2]	W, all compounds	6E+4	4E+3	2E-6	-	-	-
			St wall (8E+4)	Bone surf (7E+3)	-	1E-8	1E-3	1E-2
95	Americium-244	W, all compounds	3E+3	2E+2	8E-8	-	4E-5	4E-4
			-	Bone surf (3E+2)	-	4E-10	-	-
95	Americium-245	W, all compounds	3E+4	8E+4	3E-5	1E-7	4E-4	4E-3
95	Americium-246m[2]	W, all compounds	5E+4	2E+5	8E-5	3E-7	-	-
			St wall (6E+4)	-	-	-	8E-4	8E-3
95	Americium-246[2]	W, all compounds	3E+4	1E+5	4E-5	1E-7	4E-4	4E-3
96	Curium-238	W, all compounds	2E+4	1E+3	5E-7	2E-9	2E-4	2E-3
96	Curium-240	W, all compounds	6E+1	6E-1	2E-10	-	-	-
			Bone surf (8E+1)	(6E-1)	Bone surf -	9E-13	1E-6	1E-5
96	Curium-241	W, all compounds	1E+3	3E+1	1E-8	-	2E-5	2E-4
				Bone surf				

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion		Inhalation			Monthly
				ALI	ALI	DAC	Air	Water
			(µCi)	(µCi)	(µCi/ml)		(µCi/ml)	
			-	(4E+1)	-	5E-11	-	-
96	Curium-242	W, all compounds	3E+1	3E-1	1E-10	-	-	-
			Bone surf		Bone surf			
			(5E+1)	(3E-1)	-	4E-13	7E-7	7E-6
96	Curium-243	W, all compounds	1E+0	9E-3	4E-12	-	-	-
			Bone surf		Bone surf			
			(2E+0)	(2E-2)	-	2E-14	3E-8	3E-7
96	Curium-244	W, all compounds	1E+0	1E-2	5E-12	-	-	-
			Bone surf		Bone surf			
			(3E+0)	(2E-2)	-	3E-14	3E-8	3E-7
96	Curium-245	W, all compounds	7E-1	6E-3	3E-12	-	-	-
			Bone surf		Bone surf			
			(1E+0)	(1E-2)	-	2E-14	2E-8	2E-7
96	Curium-246	W, all compounds	7E-1	6E-3	3E-12	-	-	-
			Bone surf		Bone surf			
			(1E+0)	(1E-2)	-	2E-14	2E-8	2E-7
96	Curium-247	W, all compounds	8E-1	6E-3	3E-12	-	-	-
			Bone surf		Bone surf			
			(1E+0)	(1E-2)	-	2E-14	2E-8	2E-7
96	Curium-248	W, all compounds	2E-1	2E-3	7E-13	-	-	-
			Bone surf		Bone surf			
			(4E-1)	(3E-3)	-	4E-15	5E-9	5E-8
96	Curium-249[2]	W, all compounds	5E+4	2E+4	7E-6	-	7E-4	7E-3
				Bone surf				
			-	(3E+4)	-	4E-8	-	-
96	Curium-250	W, all compounds	4E-2	3E-4	1E-13	-	-	-
			Bone surf		Bone surf			
			(6E-2)	(5E-4)	-	8E-16	9E-10	9E-9
97	Berkelium-245	W, all compounds	2E+3	1E+3	5E-7	2E-9	3E-5	3E-4
97	Berkelium-246	W, all compounds	3E+3	3E+3	1E-6	4E-9	4E-5	4E-4
97	Berkelium-247	W, all compounds	5E-1	4E-3	2E-12	-	-	-
			Bone surf		Bone surf			
			(1E+0)	(9E-3)	-	1E-14	2E-8	2E-7
97	Berkelium-249	W, all compounds	2E+2	2E+0	7E-10	-	-	-
			Bone surf		Bone surf			
			(5E+2)	(4E+0)	-	5E-12	6E-6	6E-5

Atomic No.	Radionuclide (μCi/ml)	Average Conc. Class (μCi/ml)	Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2	Col. 3 Inhalation			
			ALI (μCi)	ALI (μCi)	ALI (μCi/ml)	DAC	Air (μCi/ml)	Water Monthly
97	Berkelium-250	W, all compounds	9E+3	3E+2	1E-7	-	1E-4	1E-3
				Bone surf				
			-	(7E+2)	-	1E-9	-	-
98	Californium-244[2]	W, all compounds except those given for Y	3E+4	6E+2	2E-7	8E-10	-	-
			St wall					
			(3E+4)	-	-	-	4E-4	4E-3
		Y, oxides and hydroxides	-	6E+2	2E-7	8E-10	-	-
98	Californium-246	W, see ^{244}Cf	4E+2	9E+0	4E-9	1E-11	5E-6	5E-5
		Y, see ^{244}Cf	-	9E+0	4E-9	1E-11	-	-
98	Californium-248	W, see ^{244}Cf	8E+0	6E-2	3E-11	-	-	-
			Bone surf		Bone surf			
			(2E+1)	(1E-1)	-	2E-13	2E-7	2E-6
		Y, see ^{244}Cf	-	1E-1	4E-11	1E-13	-	-
98	Californium-249	W, see ^{244}Cf	5E-1	4E-3	2E-12	-	-	-
			Bone surf		Bone surf			
			(1E+0)	(9E-3)	-	1E-14	2E-8	2E-7
		Y, see ^{244}Cf	-	1E-2	4E-12	-	-	-
				Bone surf				
			-	(1E-2)	-	2E-14	-	-
98	Californium-250	W, see ^{244}Cf	1E+0	9E-3	4E-12	-	-	-
			Bone surf		Bone surf			
			(2E+0)	(2E-2)	-	3E-14	3E-8	3E-7
		Y, see ^{244}Cf	-	3E-2	1E-11	4E-14	-	-
98	Californium-251	W, see ^{244}Cf	5E-1	4E-3	2E-12	-	-	-
			Bone surf		Bone surf			
			(1E+0)	(9E-3)	-	1E-14	2E-8	2E-7
		Y, see ^{244}Cf	-	1E-2	4E-12	-	-	-
				Bone surf				
			-	(1E-2)	-	2E-14	-	-
98	Californium-252	W, see ^{244}Cf	2E+0	2E-2	8E-12	-	-	-
			Bone surf		Bone surf			
			(5E+0)	(4E-2)	-	5E-14	7E-8	7E-7
		Y, see ^{244}Cf	-	3E-2	1E-11	5E-14	-	-
98	Californium-253	W, see ^{244}Cf	2E+2	2E+0	8E-10	3E-12	-	-
				Bone surf				
			(4E+2)	-	-	-	5E-6	5E-5
		Y, see ^{244}Cf	-	2E+0	7E-10	2E-12	-	-
98	Californium-254	W, see ^{244}Cf	2E+0	2E-2	9E-12	3E-14	3E-8	3E-7
		Y, see ^{244}Cf	-	2E-2	7E-12	2E-14	-	-

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion (µCi)	Table I Occupational Values Col. 2 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 3 Inhalation ALI (µCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Table II Effluent Conc. Col. 2 Air (µCi/ml)	Table II Effluent Conc. Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly
99	Einsteinium-250	W, all compounds	4E+4	5E+2	2E-7	-	6E-4		6E-3
				Bone surf					
			-	(1E+3)	-	2E-9	-		-
99	Einsteinium-251	W, all compounds	7E+3	9E+2	4E-7	-	1E-4		1E-3
				Bone surf					
			-	(1E+3)	-	2E-9	-		-
99	Einsteinium-253	W, all compounds	2E+2	1E+0	6E-10	2E-12	2E-6		2E-5
99	Einsteinium-254m	W, all compounds	3E+2	1E+1	4E-9	1E-11	-		-
			LLI wall						
			(3E+2)	-	-	-	4E-6		4E-5
99	Einsteinium-254	W, all compounds	8E+0	7E-2	3E-11	-	-		-
			Bone surf		Bone surf				
			(2E+1)	(1E-1)	-	2E-13	2E-7		2E-6
100	Fermium-252	W, all compounds	5E+2	1E+1	5E-9	2E-11	6E-6		6E-5
100	Fermium-253	W, all compounds	1E+3	1E+1	4E-9	1E-11	1E-5		1E-4
100	Fermium-254	W, all compounds	3E+3	9E+1	4E-8	1E-10	4E-5		4E-4
100	Fermium-255	W, all compounds	5E+2	2E+1	9E-9	3E-11	7E-6		7E-5
100	Fermium-257	W, all compounds	2E+1	2E-1	7E-11	-	-		-
			Bone surf		Bone surf				
			(4E+1)	(2E-1)	-	3E-13	5E-7		5E-6
101	Mendelevium-257	W, all compounds	7E+3	8E+1	4E-8	-	1E-4		1E-3
				Bone surf					
			-	(9E+1)	-	1E-10	-		-
101	Mendelevium-258	W, all compounds	3E+1	2E-1	1E-10	-	-		-
			Bone surf		Bone surf				
			(5E+1)	(3E-1)	-	5E-13	6E-7		6E-6
-	Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life less than 2 hours	Submersion [1]	-	2E+2	1E-7	1E-9	-		-
-	Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life greater than 2 hours	.....	-	2E-1	1E-10	1E-12	1E-8		1E-7

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)		Table I Occupational Values			Table II Effluent Conc.		Table III Releases to Sewers
				Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
				Oral Ingestion		Inhalation			Monthly
				ALI	ALI	DAC	Air	Water	
				(µCi)	(µCi)	(µCi/ml)	(µCi/ml)		
-	Any single radionuclide not listed above that decays by alpha emission or spontaneous fission, or any mixture for which either the identity or the concentration of any radionuclide in the mixture is not known		.....	-	4E-4	2E-13	1E-15	2E-9	2E-8

Notes

1. "Submersion" means that values given are for submersion in a hemispherical semi-infinite cloud of airborne material.

2. These radionuclides have radiological half-lives of less than 2 hours. The total effective dose equivalent received during operations with these radionuclides might include a significant contribution from external exposure. The DAC values for all radionuclides, other than those designated Class "Submersion," are based upon the committed effective dose equivalent due to the intake of the radionuclide into the body and do NOT include potentially significant contributions to dose equivalent from external exposures. The licensee may substitute 1E-7 µCi/ml for the listed DAC to account for the submersion dose prospectively, but shall use individual monitoring devices or other radiation-measuring instruments that measure external exposure to demonstrate compliance with the limits. (See §336.307 of this title (relating to Determination of External Dose from Airborne Radioactive Material).)

3. For soluble mixtures of uranium-238, uranium-234, and uranium-235 in air, chemical toxicity may be the limiting factor. (See §336.305(e) of this title (relating to Occupational Dose Limits for Adults).) If the percentage by weight (enrichment) of uranium-235 is not greater than 5, the concentration value for a 40-hour workweek is 0.2 milligram uranium/cubic meter of air average. For any enrichment, the product of the average concentration and time of exposure during a 40-hour work week shall not exceed 8E-3 (SA) µCi-hour/ml, where SA is the specific activity of the uranium inhaled. The specific activity for natural uranium is 6.77E-7 Ci/gram uranium. The specific activity for other mixtures of uranium-238, uranium-235, and uranium-234, if not known, shall be:

SA = 3.6E-7 Ci/gram uranium, for depleted uranium; or

$SA = (0.4 + 0.38\ [\text{enrichment}] + 0.0034\ [\text{enrichment}]^2)\ E\text{-}6$, for enrichment ≥ 0.72, where enrichment is the percentage by weight of uranium-235.

Note 1. If the identity of each radionuclide in a mixture is known but the concentration of one or more of the radionuclides in the mixture is not known, the DAC for the mixture shall be the most restrictive DAC of any radionuclide in the mixture.

Note 2. If the identity of each radionuclide in the mixture is not known, but it is known that certain radionuclides specified in this appendix are not present in the mixture, the inhalation ALI, DAC, and effluent and sewage concentrations for the mixture are the lowest values specified in this appendix for any radionuclide that is not known to be absent from the mixture; or: Figure 5: §336.259, Note 5

Atomic No.	Radionuclide	Average Conc. Class (µCi/ml)	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 3 Inhalation ALI (µCi/ml)	Table II Effluent Conc. Col. 1 Inhalation DAC	Table II Effluent Conc. Col. 2 Air (µCi/ml)	Table II Effluent Conc. Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly
	If it is known that Ac-227-D and Cm-250-W are not present		-	7E-4	3E-13	-	-		-
	If, in addition, it is known that Ac-227-W,Y, Th-229-W,Y, Th-230-W, Th-232-W,Y, Pa-231-W,Y, Np-237-W, Pu-239-W, Pu-240-W, Pu-242-W, Am-241-W, Am-242m-W, Am-243-W, Cm-245-W, Cm-246-W, Cm-247-W, Cm-248-W, Bk-247-W, Cf-249-W, and Cf-251-W are not present		-	7E-3	3E-12	-	-		-
	If, in addition, it is known that Sm-146-W, Sm-147-W, Gd-148-D,W, Gd-152-D,W, Th-228-W,Y, Th-230-Y, U-232-Y, U-233-Y, U-234-Y, U-235-Y, U-236-Y, U-238-Y, Np-236-W, Pu-236-W,Y, Pu-238-W,Y, Pu-239-Y, Pu-240-Y, Pu-242-Y, Pu-244-W,Y, Cm-243-W, Cm-244-W, Cf-248-W, Cf-249-Y, Cf-250-W,Y, Cf-251-Y, Cf-252-W,Y, and Cf-254-W,Y are not present		-	-	7E-2	3E-11	-		-
	If, in addition, it is known that Pb-210-D, Bi-210m-W, Po-210-D,W, Ra-223-W, Ra-225-W, Ra-226-W, Ac-225-D,W,Y, Th-227-W,Y, U-230-D,W,Y, U-232-D,W, Pu-241-W, Cm-240-W, Cm-242-W, Cf-248-Y, Es-254-W, Fm-257-W, and Md-258-W are not present		-	7E-1	3E-10	-	-		-
	If, in addition, it is known that Si-32-Y, Ti-44-Y, Fe-60-D, Sr-90-Y, Zr-93-D, Cd-113m-D, Cd-113-D, In-115-D,W, La-138-D, Lu-176-W, Hf-178m-D,W, Hf-182-D,W, Bi-210m-D, Ra-224-W, Ra-228-W, Ac-226-D,W,Y, Pa-230-W,Y, U-233-D,W, U-234-D,W, U-235-D,W, U-236-D,W, U-238-D,W, Pu-241-Y, Bk-249-W, Cf-253-W,Y, and Es-253-W are not present		-	-	7E+0	3E-9	-		-
	If it is known that Ac-227-D,W,Y, Th-229-W,Y, Th-232-W,Y, Pa-231-W,Y, Cm-248-W, and Cm-250-W are not present		-	-	-	1E-14	-		-
	If, in addition, it is known that Sm-146-W, Gd-148-D,W, Gd-152-D, Th-228-W,Y, Th-230-W,Y, U-232-Y, U-233-Y, U-234-Y, U-235-Y, U-236-Y, U-238-Y, U-Nat-Y, Np-236-W, Np-237-W, Pu-236-W,Y, Pu-238-W,Y, Pu-239-W,Y, Pu-240-W,Y, Pu-242-W,Y, Pu-244-W,Y, Am-241-W, Am-242m-W, Am-243-W, Cm-243-W, Cm-244-W, Cm-245-W, Cm-246-W, Cm-247-W, Bk-247-W, Cf-249-W,Y, Cf-250-W,Y, Cf-251-W,Y, Cf-252-W,Y, and Cf-254-W,Y								

are not present	-	-	-	1E-13	-	-
If, in addition, it is known that Sm-147-W, Gd-152-W, Pb-210-D, Bi-210m-W, Po-210-D,W, Ra-223-W, Ra-225-W, Ra-226-W, Ac-225-D,W,Y, Th-227-W,Y, U-230-D,W,Y, U-232-D,W, U-Nat-W, Pu-241-W, Cm-240-W, Cm-242-W, Cf-248-W,Y, Es-254-W, Fm-257-W, and Md-258-W are not present	-	-	-	-	1E-12	-
If, in addition, it is known that Fe-60, Sr-90, Cd-113m, Cd-113, In-115, I-129, Cs-134, Sm-145, Sm-147, Gd-148, Gd-152, Hg-194 (organic), Bi-210m, Ra-223, Ra-224, Ra-225, Ac-225, Th-228, Th-230, U-233, U-234, U-235, U-236, U-238, U-Nat, Cm-242, Cf-248, Es-254, Fm-257, and Md-258 are not present	-	-	-	-	1E-6	1E-5

Notes

Note 3. If a mixture of radionuclides consists of uranium and its daughters in ore dust (10 micrometer AMAD particle distribution assumed) before chemical separation of the uranium from the ore, the following values may be used for the DAC of the mixture: 6E-11 µCi of gross alpha activity from uranium-238, uranium-234, thorium-230, and radium-226/ml of air; 3E-11 µCi of natural uranium/ml of air; or 45 micrograms of natural uranium/cubic meter of air.

Note 4. If the identity and concentration of each radionuclide in a mixture are known, the limiting values shall be derived as follows: determine, for each radionuclide in the mixture, the ratio between the concentration present in the mixture and the concentration otherwise established in this appendix, for the specific radionuclide when not in a mixture. The sum of ratios for all of the radionuclides in the mixture may not exceed 1.

Example: If radionuclides "A," "B," and "C" are present in concentrations CA, CB, and CC, and if the applicable DACs are DAC_A, DAC_B, and DAC_C, respectively, then the concentrations shall be limited so that the following relationship exists:

$$C_A/DAC_A + C_B/DAC_B + C_C/DAC_C \leq 1$$

Adopted May 14, 1997 Effective June 5, 1997

§336.360. Appendix C. Quantities of Licensed Material Requiring Labeling.

Quantities[1] of Licensed Material Requiring Labeling

Radionuclide	Quantity (μCi)[2]	Radionuclide	Quantity (μCi)[2]
Hydrogen-3	1,000	Vanadium-47	1,000
Beryllium-7	1,000	Vanadium-48	100
Beryllium-10	1	Vanadium-49	1,000
Carbon-11	1,000	Chromium-48	1,000
Carbon-14	100	Chromium-49	1,000
Fluorine-18	1,000	Chromium-51	1,000
Sodium-22	10	Manganese-51	1,000
Sodium-24	100	Manganese-52m	1,000
Magnesium-28	100	Manganese-52	100
Aluminum-26	10	Manganese-53	1,000
Silicon-31	1,000	Manganese-54	100
Silicon-32	1	Manganese-56	1,000
Phosphorus-32	10	Iron-52	100
Phosphorus-33	100	Iron-55	100
Sulfur-35	100	Iron-59	10
Chlorine-36	10	Iron-60	1
Chlorine-38	1,000	Cobalt-55	100
Chlorine-39	1,000	Cobalt-56	10
Argon-39	1,000	Cobalt-57	100
Argon-41	1,000	Cobalt-58m	1,000
Potassium-40	100	Cobalt-58	100
Potassium-42	1,000	Cobalt-60m	1,000
Potassium-43	1,000	Cobalt-60	1
Potassium-44	1,000	Cobalt-61	1,000
Potassium-45	1,000	Cobalt-62m	1,000
Calcium-41	100	Nickel-56	100
Calcium-45	100	Nickel-57	100
Calcium-47	100	Nickel-59	100
Scandium-43	1,000	Nickel-63	100
Scandium-44m	100	Nickel-65	1,000
Scandium-44	100	Nickel-66	10
Scandium-46	10	Copper-60	1,000
Scandium-47	100	Copper-61	1,000
Scandium-48	100	Copper-64	1,000
Scandium-49	1,000	Copper-67	1,000
Titanium-44	1	Zinc-62	100
Titanium-45	1,000	Zinc-63	1,000

Quantities[1] of Licensed Material Requiring Labeling

Radionuclide	Quantity (µCi)[2]	Radionuclide	Quantity (µCi)[2]
Zinc-65	10	Bromine-74m	1,000
Zinc-69m	100	Bromine-74	1,000
Zinc-69	1,000	Bromine-75	1,000
Zinc-71m	1,000	Bromine-76	100
Zinc-72	100	Bromine-77	1,000
Gallium-65	1,000	Bromine-80m	1,000
Gallium-66	100	Bromine-80	1,000
Gallium-67	1,000	Bromine-82	100
Gallium-68	1,000	Bromine-83	1,000
Gallium-70	1,000	Bromine-84	1,000
Gallium-72	100	Krypton-74	1,000
Gallium-73	1,000	Krypton-76	1,000
Germanium-66	1,000	Krypton-77	1,000
Germanium-67	1,000	Krypton-79	1,000
Germanium-68	10	Krypton-81	1,000
Germanium-69	1,000	Krypton-83m	1,000
Germanium-71	1,000	Krypton-85m	1,000
Germanium-75	1,000	Krypton-85	1,000
Germanium-77	1,000	Krypton-87	1,000
Germanium-78	1,000	Krypton-88	1,000
Arsenic-69	1,000	Rubidium-79	1,000
Arsenic-70	1,000	Rubidium-81m	1,000
Arsenic-71	100	Rubidium-81	1,000
Arsenic-72	100	Rubidium-82m	1,000
Arsenic-73	100	Rubidium-83	100
Arsenic-74	100	Rubidium-84	100
Arsenic-76	100	Rubidium-86	100
Arsenic-77	100	Rubidium-87	100
Arsenic-78	1,000	Rubidium-88	1,000
Selenium-70	1,000	Rubidium-89	1,000
Selenium-73m	1,000	Strontium-80	100
Selenium-73	100	Strontium-81	1,000
Selenium-75	100	Strontium-83	100
Selenium-79	100	Strontium-85m	1,000
Selenium-81m	1,000	Strontium-85	100
Selenium-81	1,000	Strontium-87m	1,000
Selenium-83	1,000	Strontium-89	10

Quantities[1] of Licensed Material Requiring Labeling

Radionuclide	Quantity (µCi)[2]	Radionuclide	Quantity (µCi)[2]
Strontium-90	0.1	Molybdenum-99	100
Strontium-91	100	Molybdenum-101	1,000
Strontium-92	100	Technetium-93m	1,000
Yttrium-86m	1,000	Technetium-93	1,000
Yttrium-86	100	Technetium-94m	1,000
Yttrium-87	100	Technetium-94	1,000
Yttrium-88	10	Technetium-96m	1,000
Yttrium-90m	1,000	Technetium-96	100
Yttrium-90	10	Technetium-97m	100
Yttrium-91m	1,000	Technetium-97	1,000
Yttrium-91	10	Technetium-98	10
Yttrium-92	100	Technetium-99m	1,000
Yttrium-93	100	Technetium-99	100
Yttrium-94	1,000	Technetium-101	1,000
Yttrium-95	1,000	Technetium-104	1,000
Zirconium-86	100	Ruthenium-94	1,000
Zirconium-88	10	Ruthenium-97	1,000
Zirconium-89	100	Ruthenium-103	100
Zirconium-93	1	Ruthenium-105	1,000
Zirconium-95	10	Ruthenium-106	1
Zirconium-97	100	Rhodium-99m	1,000
Niobium-88	1,000	Rhodium-99	100
Niobium-89m		Rhodium-100	100
(66 minutes)	1,000	Rhodium-101m	1,000
Niobium-89		Rhodium-101	10
(122 minutes)	1,000	Rhodium-102m	10
Niobium-90	100	Rhodium-102	10
Niobium-93m	10	Rhodium-103m	1,000
Niobium-94	1	Rhodium-105	100
Niobium-95m	100	Rhodium-106m	1,000
Niobium-95	100	Rhodium-107	1,000
Niobium-96	100	Palladium-100	100
Niobium-97	1,000	Palladium-101	1,000
Niobium-98	1,000	Palladium-103	100
Molybdenum-90	100	Palladium-107	10
Molybdenum-93m	100	Palladium-109	100
Molybdenum-93	10	Silver-102	1,000

Quantities[1] of Licensed Material Requiring Labeling

Radionuclide	Quantity (µCi)[2]	Radionuclide	Quantity (µCi)[2]
Silver-103	1,000	Tin-113	100
Silver-104m	1,000	Tin-117m	100
Silver-104	1,000	Tin-119m	100
Silver-105	100	Tin-121m	100
Silver-106m	100	Tin-121	1,000
Silver-106	1,000	Tin-123m	1,000
Silver-108m	1	Tin-123	10
Silver 110m	10	Tin-125	10
Silver-111	100	Tin-126	10
Silver-112	100	Tin-127	1,000
Silver-115	1,000	Tin-128	1,000
Cadmium-104	1,000	Antimony-115	1,000
Cadmium-107	1,000	Antimony-116m	1,000
Cadmium-109	1	Antimony-116	1,000
Cadmium-113m	0.1	Antimony-117	1,000
Cadmium-113	100	Antimony-118m	1,000
Cadmium-115m	10	Antimony-119	1,000
Cadmium-115	100	Antimony-120	
Cadmium-117m	1,000	(16 minutes)	1,000
Cadmium-117	1,000	Antimony-120	
Indium-109	1,000	(5.76 days)	100
Indium-110		Antimony-122	100
(69.1 minutes)	1,000	Antimony-124m	1,000
Indium-110		Antimony-124	10
(4.9 hours)	1,000	Antimony-125	100
Indium-111	100	Antimony-126m	1,000
Indium-112	1,000	Antimony-126	100
Indium-113m	1,000	Antimony-127	100
Indium-114m	10	Antimony-128	
Indium-115m	1,000	(10.4 minutes)	1,000
Indium-115	100	Antimony-128	
Indium-116m	1,000	(9.01 hours)	100
Indium-117m	1,000	Antimony-129	100
Indium-117	1,000	Antimony-130	1,000
Indium-119m	1,000	Antimony-131	1,000
Tin-110	100	Tellurium-116	1,000
Tin-111	1,000	Tellurium-121m	10

Quantities[1] of Licensed Material Requiring Labeling

Radionuclide	Quantity (µCi)[2]	Radionuclide	Quantity (µCi)[2]
Tellurium-121	100	Xenon-131m	1,000
Tellurium-123m	10	Xenon-133m	1,000
Tellurium-123	100	Xenon-133	1,000
Tellurium-125m	10	Xenon-135m	1,000
Tellurium-127m	10	Xenon-135	1,000
Tellurium-127	1,000	Xenon-138	1,000
Tellurium-129m	10	Cesium-125	1,000
Tellurium-129	1,000	Cesium-127	1,000
Tellurium-131m	10	Cesium-129	1,000
Tellurium-131	100	Cesium-130	1,000
Tellurium-132	10	Cesium-131	1,000
Tellurium-133m	100	Cesium-132	100
Tellurium-133	1,000	Cesium-134m	1,000
Tellurium-134	1,000	Cesium-134	10
Iodine-120m	1,000	Cesium-135m	1,000
Iodine-120	100	Cesium-135	100
Iodine-121	1,000	Cesium-136	10
Iodine-123	100	Cesium-137	10
Iodine-124	10	Cesium-138	1,000
Iodine-125	1	Barium-126	1,000
Iodine-126	1	Barium-128	100
Iodine-128	1,000	Barium-131m	1,000
Iodine-129	1	Barium-131	100
Iodine-130	10	Barium-133m	100
Iodine-131	1	Barium-133	100
Iodine-132m	100	Barium-135m	100
Iodine-132	100	Barium-139	1,000
Iodine-133	10	Barium-140	100
Iodine-134	1,000	Barium-141	1,000
Iodine-135	100	Barium-142	1,000
Xenon-120	1,000	Lanthanum-131	1,000
Xenon-121	1,000	Lanthanum-132	100
Xenon-122	1,000	Lanthanum-135	1,000
Xenon-123	1,000	Lanthanum-137	10
Xenon-125	1,000	Lanthanum-138	100
Xenon-127	1,000	Lanthanum-140	100
Xenon-129m	1,000	Lanthanum-141	100

Quantities[1] of Licensed Material Requiring Labeling

Radionuclide	Quantity (µCi)[2]	Radionuclide	Quantity (µCi)[2]
Lanthanum-142	1,000	Promethium-150	1,000
Lanthanum-143	1,000	Promethium-151	100
Cerium-134	100	Samarium-141m	1,000
Cerium-135	100	Samarium-141	1,000
Cerium-137m	100	Samarium-142	1,000
Cerium-137	1,000	Samarium-145	100
Cerium-139	100	Samarium-146	1
Cerium-141	100	Samarium-147	100
Cerium-143	100	Samarium-151	10
Cerium-144	1	Samarium-153	100
Praseodymium-136	1,000	Samarium-155	1,000
Praseodymium-137	1,000	Samarium-156	1,000
Praseodymium-138m	1,000	Europium-145	100
Praseodymium-139	1,000	Europium-146	100
Praseodymium-142m	1,000	Europium-147	100
Praseodymium-142	100	Europium-148	10
Praseodymium-143	100	Europium-149	100
Praseodymium-144	1,000	Europium-150	
Praseodymium-145	100	(12.62 hours)	100
Praseodymium-147	1,000	Europium-150	
Neodymium-136	1,000	(34.2 years)	1
Neodymium-138	100	Europium-152m	100
Neodymium-139m	1,000	Europium-152	1
Neodymium-139	1,000	Europium-154	1
Neodymium-141	1,000	Europium-155	10
Neodymium-147	100	Europium-156	100
Neodymium-149	1,000	Europium-157	100
Neodymium-151	1,000	Europium-158	1,000
Promethium-141	1,000	Gadolinium-145	1,000
Promethium-143	100	Gadolinium-146	10
Promethium-144	10	Gadolinium-147	100
Promethium-145	10	Gadolinium-148	0.001
Promethium-146	1	Gadolinium-149	100
Promethium-147	10	Gadolinium-151	10
Promethium-148m	10	Gadolinium-152	100
Promethium-148	10	Gadolinium-153	10
Promethium-149	100	Gadolinium-159	100

Quantities[1] of Licensed Material Requiring Labeling

Radionuclide	Quantity (µCi)[2]	Radionuclide	Quantity (µCi)[2]
Terbium-147	1,000	Thulium-162	1,000
Terbium-149	100	Thulium-166	100
Terbium-150	1,000	Thulium-167	100
Terbium-151	100	Thulium-170	10
Terbium-153	1,000	Thulium-171	10
Terbium-154	100	Thulium-172	100
Terbium-155	1,000	Thulium-173	100
Terbium-156m		Thulium-175	1,000
(5.0 hours)	1,000	Ytterbium-162	1,000
Terbium-156m		Ytterbium-166	100
(24.4 hours)	1,000	Ytterbium-167	1,000
Terbium-156	100	Ytterbium-169	100
Terbium-157	10	Ytterbium-175	100
Terbium-158	1	Ytterbium-177	1,000
Terbium-160	10	Ytterbium-178	1,000
Terbium-161	100	Lutetium-169	100
Dysprosium-155	1,000	Lutetium-170	100
Dysprosium-157	1,000	Lutetium-171	100
Dysprosium-159	100	Lutetium-172	100
Dysprosium-165	1,000	Lutetium-173	10
Dysprosium-166	100	Lutetium-174m	10
Holmium-155	1,000	Lutetium-174	10
Holmium-157	1,000	Lutetium-176m	1,000
Holmium-159	1,000	Lutetium-176	100
Holmium-161	1,000	Lutetium-177m	10
Holmium-162m	1,000	Lutetium-177	100
Holmium-162	1,000	Lutetium-178m	1,000
Holmium-164m	1,000	Lutetium-178	1,000
Holmium-164	1,000	Lutetium-179	1,000
Holmium-166m	1	Hafnium-170	100
Holmium-166	100	Hafnium-172	1
Holmium-167	1,000	Hafnium-173	1,000
Erbium-161	1,000	Hafnium-175	100
Erbium-165	1,000	Hafnium-177m	1,000
Erbium-169	100	Hafnium-178m	0.1
Erbium-171	100	Hafnium-179m	10
Erbium-172	100	Hafnium-180m	1,000

Quantities[1] of Licensed Material Requiring Labeling

Radionuclide	Quantity (µCi)[2]	Radionuclide	Quantity (µCi)[2]
Hafnium-181	10	Rhenium-184	100
Hafnium-182m	1,000	Rhenium-186m	10
Hafnium-182	0.1	Rhenium-186	100
Hafnium-183	1,000	Rhenium-187	1,000
Hafnium-184	100	Rhenium-188m	1,000
Tantalum-172	1,000	Rhenium-188	100
Tantalum-173	1,000	Rhenium-189	100
Tantalum-174	1,000	Osmium-180	1,000
Tantalum-175	1,000	Osmium-181	1,000
Tantalum-176	100	Osmium-182	100
Tantalum-177	1,000	Osmium-185	100
Tantalum-178	1,000	Osmium-189m	1,000
Tantalum-179	100	Osmium-191m	1,000
Tantalum-180m	1,000	Osmium-191	100
Tantalum-180	100	Osmium-193	100
Tantalum-182m	1,000	Osmium-194	1
Tantalum-182	10	Iridium-182	1,000
Tantalum-183	100	Iridium-184	1,000
Tantalum-184	100	Iridium-185	1,000
Tantalum-185	1,000	Iridium-186	100
Tantalum-186	1,000	Iridium-187	1,000
Tungsten-176	1,000	Iridium-188	100
Tungsten-177	1,000	Iridium-189	100
Tungsten-178	1,000	Iridium-190m	1,000
Tungsten-179	1,000	Iridium-190	100
Tungsten-181	1,000	Iridium-192	
Tungsten-185	100	(73.8 days)	1
Tungsten-187	100	Iridium-192m	
Tungsten-188	10	(1.4 minutes)	10
Rhenium-177	1,000	Iridium-194m	10
Rhenium-178	1,000	Iridium-194	100
Rhenium-181	1,000	Iridium-195m	1,000
Rhenium-182		Iridium-195	1,000
(12.7 hours)	1,000	Platinum-186	1,000
Rhenium-182		Platinum-188	100
(64.0 hours)	100	Platinum-189	1,000
Rhenium-184m	10	Platinum-191	100

Quantities[1] of Licensed Material Requiring Labeling

Radionuclide	Quantity (µCi)[2]	Radionuclide	Quantity (µCi)[2]
Platinum-193m	100	Lead-198	1,000
Platinum-193	1,000	Lead-199	1,000
Platinum-195m	100	Lead-200	100
Platinum-197m	1,000	Lead-201	1,000
Platinum-197	100	Lead-202m	1,000
Platinum-199	1,000	Lead-202	10
Platinum-200	100	Lead-203	1,000
Gold-193	1,000	Lead-205	100
Gold-194	100	Lead-209	1,000
Gold-195	10	Lead-210	0.01
Gold-198m	100	Lead-211	100
Gold-198	100	Lead-212	1
Gold-199	100	Lead-214	100
Gold-200m	100	Bismuth-200	1,000
Gold-200	1,000	Bismuth-201	1,000
Gold-201	1,000	Bismuth-202	1,000
Mercury-193m	100	Bismuth-203	100
Mercury-193	1,000	Bismuth-205	100
Mercury-194	1	Bismuth-206	100
Mercury-195m	100	Bismuth-207	10
Mercury-195	1,000	Bismuth-210m	0.1
Mercury-197m	100	Bismuth-210	l
Mercury-197	1,000	Bismuth-212	10
Mercury-199m	1,000	Bismuth-213	10
Mercury-203	100	Bismuth-214	100
Thallium-194m	1,000	Polonium-203	1,000
Thallium-194	1,000	Polonium-205	1,000
Thallium-195	1,000	Polonium-207	1,000
Thallium-197	1,000	Polonium-210	0.1
Thallium-198m	1,000	Astatine-207	100
Thallium-198	1,000	Astatine-211	10
Thallium-199	1,000	Radon-220	1
Thallium-200	1,000	Radon-222	1
Thallium-201	1,000	Francium-222	100
Thallium-202	100	Francium-223	100
Thallium-204	100	Radium-223	0.1
Lead-195m	1,000	Radium-224	0.1

Quantities[1] of Licensed Material Requiring Labeling

Radionuclide	Quantity (µCi)[2]	Radionuclide	Quantity (µCi)[2]
Radium-225	0.1	Neptunium-232	100
Radium-226	0.1	Neptunium-233	1,000
Radium-227	1,000	Neptunium-234	100
Radium-228	0.1	Neptunium-235	100
Actinium-224	1	Neptunium-236	
Actinium-225	0.01	(1.15×10^5 years)	0.001
Actinium-226	0.1	Neptunium-236	
Actinium-227	0.001	(22.5 hours)	1
Actinium-228	1	Neptunium-237	0.001
Thorium-226	10	Neptunium-238	10
Thorium-227	0.01	Neptunium-239	100
Thorium-228	0.001	Neptunium-240	1,000
Thorium-229	0.001	Plutonium-234	10
Thorium-230	0.001	Plutonium-235	1,000
Thorium-231	100	Plutonium-236	0.001
Thorium-232	100	Plutonium-237	100
Thorium-234	10	Plutonium-238	0.001
Thorium-natural	100	Plutonium-239	0.001
Protactinium-227	10	Plutonium-240	0.001
Protactinium-228	1	Plutonium-241	0.01
Protactinium-230	0.1	Plutonium-242	0.001
Protactinium-231	0.001	Plutonium-243	1,000
Protactinium-232	1	Plutonium-244	0.001
Protactinium-233	100	Plutonium-245	100
Protactinium-234	100	Americium-237	1,000
Uranium-230	0.01	Americium-238	100
Uranium-231	100	Americium-239	1,000
Uranium-232	0.001	Americium-240	100
Uranium-233	0.001	Americium-241	0.001
Uranium-234	0.001	Americium-242m	0.001
Uranium-235	0.001	Americium-242	10
Uranium-236	0.001	Americium-243	0.001
Uranium-237	100	Americium-244m	100
Uranium-238	100	Americium-244	10
Uranium-239	1,000	Americium-245	1,000
Uranium-240	100	Americium-246m	1,000
Uranium-natural	100		

Quantities[1] of Licensed Material Requiring Labeling

Radionuclide	Quantity (µCi)[2]	Radionuclide	Quantity (µCi)[2]
Americium-246	1,000	Californium-248	0.01
Curium-238	100	Californium-249	0.001
Curium-240	0.1	Californium-250	0.001
Curium-241	1	Californium-251	0.001
Curium-242	0.01	Californium-252	0.001
Curium-243	0.001	Californium-253	0.1
Curium-244	0.001	Californium-254	0.001
Curium-245	0.001	Einsteinium-250	100
Curium-246	0.001	Einsteinium-251	100
Curium-247	0.001	Einsteinium-253	0.1
Curium-248	0.001	Einsteinium-254m	1
Curium-249	1,000	Einsteinium-254	0.01
Berkelium-245	100	Fermium-252	1
Berkelium-246	100	Fermium-253	1
Berkelium-247	0.001	Fermium-254	10
Berkelium-249	0.1	Fermium-255	1
Berkelium-250	10	Fermium-257	0.01
Californium-244	100	Mendelevium-257	10
Californium-246	1	Mendelevium-258	0.01
Any alpha-emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition	0.001		
Any radionuclide other than alpha-emitting radionuclides not listed above, or mixtures of beta emitters of unknown composition	0.01		

Note

1. The quantities listed in this appendix were derived by taking 1/10th of the most restrictive ALI listed in §336.359, Appendix B, Table I, Columns 1 and 2, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage), rounding to the nearest factor of 10, and arbitrarily constraining the values listed between 0.001 and 1,000 microcuries. Values of 100 microcuries have been assigned for radionuclides having a radioactive half-life in excess of 10^9 years (except rhenium, 1,000 microcuries) to take into account their low specific activities.

2. To convert microcuries to kilobecquerels, multiply the microcurie value by 37.

Note. For purposes of §336.326(e) of this title (relating to Posting Requirements), §336.329(a)(1) of this title (relating to Exemptions to Labeling Requirements), and §336.350(a) of this title (relating to Reports of Stolen, Lost, or Missing Licensed Radioactive Material) where there is involved a combination of radionuclides in known amounts, the limit for the combination shall be derived as follows: determine, for each radionuclide in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific radionuclide when not in combination. The sum of ratios for all radionuclides in the combination may not exceed 1.

Adopted May 14, 1997 Effective June 5, 1997

§336.361. Appendix D. Requirements for Receipt of Low-Level Radioactive Waste for Disposal at Licensed Land Disposal Facilities and Manifests.

(a) Manifest. The operator of a licensed low-level radioactive waste land disposal facility shall not receive for disposal any waste which does not have a completed shipment manifest which meets the requirements of 10 CFR 61.80 as amended through December 27, 1982 (47 FedReg 57463) and 10 CFR 20.2006 as amended through March 27, 1995 (60 FedReg 15663), including all prescribed information and certifications. The manifest required by this subsection may be shipping papers used to meet United States Department of Transportation or United States Environmental Protection Agency regulations or the requirements of the land disposal facility, provided all the required information is included. Copies of manifests required by this subsection may be legible carbon copies or legible photocopies.

(b) Control and tracking.

(1) The licensed land disposal facility operator shall acknowledge receipt of the waste within 1 week of receipt by returning a signed copy of the manifest or equivalent documentation to the shipper. The shipper to be notified is that who last possessed the waste and transferred the waste to the operator. The returned copy of the manifest or equivalent documentation shall indicate any discrepancies between materials listed on the manifest and materials received.

(2) The land disposal facility operator shall maintain copies of all completed manifests or equivalent documentation until the license is terminated. This includes those manifests or equivalent documents required under the standards for protection against radiation in effect before January 1, 1994.

(3) The land disposal facility operator shall notify the shipper (i.e., the generator, collector, or processor), the Texas Department of Health, and the executive director when any shipment or part of a shipment has not arrived within 60 days after the advance manifest was received.

Adopted May 14, 1997 Effective June 5, 1997

§336.362. Appendix E. Classification and Characteristics of Low-Level Radioactive Waste.

(a) Classification of radioactive waste for near-surface disposal.

(1) Considerations. Determination of the classification of radioactive waste involves two considerations. First, consideration must be given to the concentration of long-lived radionuclides (and their shorter-lived precursors) whose potential hazards persist long after precautions such as institutional controls, improved waste form, and deeper disposal have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures. In addition, the magnitude of the potential dose is limited by the concentration and availability of the radionuclide at the time of exposure. Second, consideration must be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective.

(2) Classes of waste.

(A) Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of Class A waste must meet the minimum requirements set forth in subsection (b)(1) of this appendix. If Class A waste also meets the stability requirements set forth in subsection (b)(2) of this appendix, it is not necessary to segregate the waste for disposal.

(B) Class B waste is waste that must meet more rigorous requirements on waste form to ensure stability after disposal. The physical form and characteristics of Class B waste must meet both the minimum and stability requirements set forth in subsection (b) of this appendix.

(C) Class C waste is waste that not only must meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of Class C waste must meet both the minimum and stability requirements set forth in subsection (b) of this appendix.

(D) Waste that is not generally acceptable for near-surface disposal is waste for which form and disposal methods must be different, and in general more stringent, than those specified for Class C waste. Disposal of this waste is regulated by the United States Nuclear Regulatory Commission.

(3) Classification determined by long-lived radionuclides. If the radioactive waste contains only radionuclides listed in Table I, classification shall be determined as follows:

(A) If the concentration does not exceed 0.1 times the value in Table I, the waste is Class A.

(B) If the concentration exceeds 0.1 times the value in Table I but does not exceed the value in Table I, the waste is Class C.

(C) If the concentration exceeds the value in Table I, the waste is not generally acceptable for near-surface disposal.

(D) For wastes containing mixtures of radionuclides listed in Table I, the total concentration shall be determined by the sum of fractions rule described in paragraph (7) of this subsection.

Table I

Radionuclide	Concentration curies/cubic meter[1]	Concentration nanocuries/ gram[2]
C-14	8	
C-14 in activated metal	80	
Ni-59 in activated metal	220	
Nb-94 in activated metal	0.2	
Tc-99	3	
I-129	0.08	
Alpha-emitting transuranic radionuclides with half-life greater than 5 years		100
Pu-241		3,500
Cm-242		20,000
Ra-226		100

1. To convert the curies/cubic meter (Ci/m^3) value to gigabecquerels/cubic meter, multiply the Ci/m^3 value by 37.

2. To convert the nanocuries/gram (nCi/g) value to becquerels/gram, multiply the nCi/g value by 37.

(4) Classification determined by short-lived radionuclides. If the radioactive waste does not contain any of the radionuclides listed in Table I, classification shall be determined based on the concentrations shown in Table II. However, as specified in paragraph (6) of this subsection, if radioactive waste does not contain any nuclides listed in either Table I or II, it is Class A.

(A) If the concentration does not exceed the value in Column 1, the waste is Class A.

(B) If the concentration exceeds the value in Column 1 but does not exceed the value in Column 2, the waste is Class B.

(C) If the concentration exceeds the value in Column 2 but does not exceed the value in Column 3, the waste is Class C.

(D) If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal.

(E) For wastes containing mixtures of the radionuclides listed in Table II, the total concentration shall be determined by the sum of fractions rule described in paragraph (7) of this subsection.

Table II

Radionuclide	Concentration, curies/cubic meter[1]		
	Column 1	Column 2	Column 3
Total of all radionuclides with less than 5-year half-life	700	[2]	[2]
H-3	40	[2]	[2]
Co-60	700	[2]	[2]
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7,000
Sr-90	0.04	150	7,000
Cs-137	1	44	4,600

1. To convert the curies/cubic meter (Ci/m^3) value to gigabecquerels/cubic meter, multiply the Ci/m^3 value by 37.

2. There are no limits established for these radionuclides in Class B or C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentrations of other radionuclides in Table II determine the waste to be Class C independent of these radionuclides.

(5) Classification determined by both long- and short-lived radionuclides. If the radioactive waste contains a mixture of radionuclides, some of which are listed in Table I and some of which are listed in Table II, classification shall be determined as follows:

(A) If the concentration of a radionuclide listed in Table I does not exceed 0.1 times the value listed in Table I, the class shall be that determined by the concentration of radionuclides listed in Table II.

(B) If the concentration of a radionuclide listed in Table I exceeds 0.1 times the value listed in Table I but does not exceed the value in Table I, the waste shall be Class C, provided the concentration of radionuclides listed in Table II does not exceed the value shown in Column 3 of Table II.

(6) Classification of wastes with radionuclides other than those listed in Tables I and II. If the waste does not contain any radionuclides listed in either Table I or II, it is Class A.

(7) The sum of the fractions rule for mixtures of radionuclides. For determining classification for waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each radionuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits must all be taken from the same column of the same table. The sum of the fractions for the column must be less than 1.0 if the waste class is to be determined by that column. For example, if a waste contains strontium-90 in a concentration of 50 curies/cubic meter (Ci/m^3) (1.85 terabecquerels/m^3) and cesium-137 in a concentration of 22 Ci/m^3 (814 gigabecquerels/m^3), since the concentrations both exceed the values in Column 1, Table II, they must be compared to the Column 2 values. For the strontium-90 fraction, 50/150 = 0.33, and for the cesium-137 fraction, 22/44 = 0.5; the sum of the fractions = 0.83. Since the sum is less than 1.0, the waste is Class B.

(8) Determination of concentrations in wastes. The concentration of a radionuclide may be determined by indirect methods, such as use of scaling factors which relate the inferred concentration of one radionuclide to another that is measured, or radionuclide material accountability, if there is reasonable assurance that the indirect methods can be correlated with actual measurements. The concentration of a radionuclide may be averaged over the volume of the waste, or weight of the waste if the units are expressed as nanocuries per gram.

(b) Radioactive waste characteristics.

(1) The following are minimum requirements for all classes of waste and are intended to facilitate handling and to provide protection of health and safety of personnel at the disposal site.

(A) Waste shall be packaged in conformance with the conditions of the license issued for the disposal site. Where the license conditions for the disposal site are more restrictive than the provisions of this appendix, the license conditions shall govern.

(B) Waste shall not be packaged for disposal in cardboard or fiberboard boxes.

(C) Liquid waste shall be solidified or packaged in sufficient absorbent material to absorb twice the volume of the liquid.

(D) Solid waste containing liquid shall contain as little free-standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1.0% of the volume.

(E) Waste shall not be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures or of explosive reaction with water.

(F) Waste shall not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This does not apply to radioactive gaseous waste packaged in accordance with paragraph (1)(H) of this subsection.

(G) Waste must not be pyrophoric. Pyrophoric materials contained in waste shall be treated, prepared, and packaged to be nonflammable.

(H) Waste in a gaseous form shall be packaged at an absolute pressure that does not exceed 1.5 atmospheres at 20 degrees Celsius. Total activity shall not exceed 100 curies (3.7 terabecquerels) per container.

(I) Waste containing hazardous, biological, pathogenic, or infectious material shall be treated to reduce to the maximum extent practicable the potential hazard from the nonradiological materials.

(2) The following requirements are intended to provide stability of the waste. Stability is intended to ensure that the waste does not degrade and affect overall stability of the site through slumping, collapse, or other failure of the disposal unit and thereby lead to water infiltration. Stability is also a factor in limiting exposure to an inadvertent intruder, since it provides a recognizable and nondispersible waste.

(A) Waste shall have structural stability. A structurally stable waste form will generally maintain its physical dimensions and its form, under the expected disposal conditions such as weight of overburden and compaction equipment, the presence of moisture, and microbial activity and internal factors such as radiation effects and chemical changes. Structural stability can be provided by the waste form itself, processing the waste to a stable form, or placing the waste in a disposal container or structure that provides stability after disposal.

(B) Notwithstanding the provisions in paragraphs (1)(C) and (D) of this subsection, liquid wastes, or wastes containing liquid, shall be converted into a form that contains as little free-standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1.0% of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5% of the volume of the waste for waste processed to a stable form.

(C) Void spaces within the waste and between the waste and its package shall be reduced to the extent practicable.

(c) Labeling. Each package of waste shall be clearly labeled to identify whether it is Class A, Class B, or Class C waste, in accordance with subsection (a) of this appendix.

Adopted May 14, 1997 Effective June 5, 1997

§336.363. Appendix F. Requirements for Receipt of Low-Level Radioactive Waste for Disposal at Licensed Land Disposal Facilities and Uniform Manifests.

(a) Manifest requirements for shipments received at licensed land disposal facilities.

(1) Manifest forms required.

(A) The operator of a licensed low-level radioactive waste land disposal facility shall not receive for disposal any waste which does not have a completed manifest which reflects the information requested on applicable United States Nuclear Regulatory Commission (NRC) Forms 540 (Uniform Low-Level Radioactive Waste Manifest (Shipping Paper)) and 541 (Uniform Low-Level Radioactive Waste Manifest (Container and Waste Description)) and, if necessary, on an applicable NRC Form 542 (Uniform Low-Level Radioactive Waste Manifest (Manifest Index and Regional Compact Tabulation)), as those forms and requirements are prescribed in 10 CFR 61.80 as amended through December 27, 1982 (47 FedReg 57463) (relating to Licensing Requirements for Land Disposal of Radioactive Waste) and 10 CFR 20.2006 as amended through March 27, 1995 (60 FedReg 15663) (relating to Standards for Protection Against Radiation). The NRC Forms 540 and 540A must be completed and must physically accompany the waste shipment received at the licensed land disposal facility. Upon agreement between the shipper and the licensed land disposal facility, NRC Forms 541 and 541A and 542 and 542A may be completed, transmitted, and stored in electronic media with the capability for producing legible, accurate, and complete records on the respective forms.

(B) Copies of manifests required by this appendix may be legible carbon copies, photocopies, or computer printouts that reproduce the data in the format of the uniform manifest.

(C) This appendix includes information requirements of the United States Department of Transportation (DOT), as codified in 49 CFR Part 172. Specific information on hazardous, medical, or other waste that is required to meet United States Environmental Protection Agency (EPA) rules, as codified in 40 CFR Parts 259, 261, or elsewhere, is not addressed in this appendix and must be provided on the required EPA forms. However, the required EPA forms must accompany the Uniform Low-Level Radioactive Waste Manifest required by this appendix.

(2) Definitions. Terms used in this appendix have the definitions set forth as follows:

(A) Computer-readable medium - Means that the regulatory agency's computer can transfer the information from the medium into its memory.

(B) NRC Forms 540, 540A, 541, 541A, 542, and 542A - Official NRC forms referenced in this appendix, as those forms and requirements are prescribed in 10 CFR 61.80 as amended through December 27, 1982 (47 FedReg 57463) and 10 CFR 20.2006 as amended through March 27, 1995 (60 FedReg 15663). Forms received by the licensed land disposal facility need not be the originals of these forms provided that any substitute forms are equivalent to the original documentation in respect to content, clarity, size, and location of information. Upon agreement between the shipper and the licensed land disposal facility, NRC Forms 541 (and 541A) and 542 (and 542A) may be completed, transmitted, and stored in electronic media. The electronic media must have the capability for producing legible, accurate, and complete records in the format of the uniform manifest.

(C) Shipper - For purposes of the rules in this appendix, the waste generator, waste collector, or waste processor who offers low-level radioactive waste for transportation and consigns the waste to a licensed land disposal facility operator.

(D) Shipping paper - NRC Form 540 and, if required, NRC Form 540A, as those forms and requirements are prescribed in 10 CFR 61.80 as amended through December 27, 1982 (47 FedReg 57463) and 10 CFR 20.2006 as amended through March 27, 1995 (60 FedReg 15663), which include the information required by DOT in 49 CFR Part 172.

(E) Uniform Low-Level Radioactive Waste Manifest or uniform manifest - The combination of NRC Forms 540, 541, and, if necessary, 542, and their respective continuation sheets (Forms 540A, 541A, and 542A) as needed, or equivalent, as those forms and requirements are prescribed in 10 CFR 61.80 as amended through December 27, 1982 (47 FedReg 57463) and 10 CFR 20.2006 as amended through March 27, 1995 (60 FedReg 15663).

(3) Information requirements. The uniform manifest for waste received for disposal at a licensed land disposal facility shall include all information required by instructions accompanying the forms and by 10 CFR 61.80 as amended through December 27, 1982 (47 FedReg 57463) and 10 CFR 20.2006 as amended through March 27, 1995 (60 FedReg 15663). This information shall include, as appropriate, general information, shipment information, disposal container and waste information, uncontainerized waste information, multi-generator disposal container information, and certifications.

(b) Control and tracking.

(1) The licensed land disposal facility operator shall acknowledge receipt of the waste within 1 week of receipt by returning, as a minimum, a signed copy of NRC Form 540 to the shipper, as this form and requirements are prescribed in 10 CFR 61.80 as amended through December 27, 1982 (47 FedReg 57463) and 10 CFR 20.2006 as amended through March 27, 1995 (60 FedReg 15663). The shipper to be notified is that who last possessed the waste and transferred the waste to the operator. If a discrepancy exists between materials listed on the uniform manifest and materials received, copies or electronic transfer of the affected forms must be returned indicating the discrepancy.

(2) The land disposal facility operator shall maintain copies of all completed manifests and electronically store the information required by §336.740(i) of this title (relating to Maintenance of Records and Reports) until the commission terminates the license.

(3) The land disposal facility operator shall notify the shipper, the Texas Department of Health, and the executive director when any shipment, or part of a shipment, has not arrived within 60 days after receipt of an advance manifest, unless notified by the shipper that the shipment has been canceled.
Adopted May 14, 1997 Effective June 5, 1997

§336.364. Appendix G. Acceptable Surface Contamination Levels.

Acceptable Surface Contamination Levels

Radionuclide[1]	Average[2,3,6]	Maximum[2,4,6]	Removable[2,3,5,6]

U-natural, U-235, U-238, and associated decay products except Ra-226, Th-230, Ac-227, and Pa-231	5,000 dpm alpha/ 100 cm^2	15,000 dpm alpha/ 100 cm^2	1,000 dpm alpha/ 100 cm^2
Transuranics, Ra-223, Ra-224, Ra-226, Ra-228 Th-natural, Th-228, Th-230, Th-232, U-232, Pa-231, Ac-227, Sr-90, I-125, I-126, I-129, I-131, and I-133	1,000 dpm/ 100 cm^2	3,000 dpm/ 100 cm^2	200 dpm/ 100 cm^2
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000 dpm beta-gamma/ 100 cm^2	15,000 dpm beta-gamma/ 100 cm^2	1,000 dpm beta-gamma/100 cm^2

1. Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should be applied independently.

2. As used in this appendix, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

3. Average contamination level shall not be measured over more than 1 square meter. For objects of less surface area, the average shall be derived for each object.

4. The maximum contamination level applies to an area of not more than 100 square centimeters (cm^2).

5. The amount of removable radioactive material per 100 cm^2 of surface area shall be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels shall be reduced proportionally and the entire surface shall be wiped.

6. The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters shall not exceed 0.2 millirad/hour at 1 cm and 1.0 millirad/hour at 1 cm, respectively, measured through not more than 7 milligrams/cm^2 of total absorber.

§336.365. Appendix H. Radionuclide Concentration and Annual Activity Limits for Disposal in a Type I Municipal Solid Waste Facility or a Hazardous Waste Facility.

Radionuclide Concentration and Annual Activity Limits
for Disposal in a Type I Municipal Solid Waste
Facility or a Hazardous Waste Facility
(For use in §336.337 of this title (relating
to Disposal of Specific Wastes))

Disposal Radionuclide	Concentration Limit (curies/m^3)	Annual Generator Limit (curies/yr)
Fluorine-18	3×10^{-1}	8
Sodium-24	9×10^{-4}	2×10^{-2}
Silicon-31	$1 \times 10^{+2}$	$3 \times 10^{+3}$
Phosphorus-32	2	50
Phosphorus-33	10	$3 \times 10^{+2}$
Sulfur-35	9	$2 \times 10^{+2}$
Argon-41	3×10^{-1}	8
Potassium-42	2×10^{-2}	5×10^{-1}
Calcium-45	4	$1 \times 10^{+2}$
Calcium-47	2×10^{-2}	5×10^{-1}
Scandium-46	2×10^{-3}	5×10^{-2}
Chromium-51	6×10^{-1}	20
Iron-59	5×10^{-3}	1×10^{-1}
Cobalt-57	6×10^{-2}	2
Cobalt-58	1×10^{-2}	3×10^{-1}
Zinc-65	7×10^{-3}	2×10^{-1}
Gallium-67	3×10^{-1}	8
Selenium-75	5×10^{-2}	1
Bromine-82	2×10^{-3}	5×10^{-2}
Rubidium-86	4×10^{-2}	1
Strontium-85	2×10^{-2}	5×10^{-1}
Strontium-89	8	$2 \times 10^{+2}$
Yttrium-90	4	$1 \times 10^{+2}$
Yttrium-91	4×10^{-1}	10
Zirconium-95	8×10^{-3}	2×10^{-1}
Niobium-95	8×10^{-3}	2×10^{-1}
Molybdenum-99	5×10^{-2}	1
Technetium-99m	1	30
Rhodium-106	1	30
Silver-110m	2×10^{-3}	5×10^{-2}
Cadmium-115m	2×10^{-1}	5
Indium-111	9×10^{-2}	2
Indium-113m	9	$2 \times 10^{+2}$
Tin-113	6×10^{-2}	2
Tin-119	20	$5 \times 10^{+2}$

Disposal Radionuclide	Concentration Limit (curies/m^3)	Annual Generator Limit (curies/yr)
Antimony-124	2×10^{-3}	5×10^{-2}
Iodine-123	4×10^{-1}	10
Iodine-125	7×10^{-1}	20
Iodine-131	4×10^{-2}	1
Iodine-133	2×10^{-2}	5×10^{-1}
Tellurium-129	2×10^{-1}	5
Xenon-127	8×10^{-2}	2
Xenon-133	1	30
Barium-140	2×10^{-3}	5×10^{-2}
Lanthanum-140 2×10^{-3}		5×10^{-2}
Cerium-141	4×10^{-1}	10
Cerium-144	1×10^{-3}	3×10^{-2}
Praseodymium-143	6	$2 \times 10^{+2}$
Neodymium-147	7×10^{-2}	2
Ytterbium-169	6×10^{-2}	2
Iridium-192	1×10^{-2}	3×10^{-1}
Gold-198	3×10^{-2}	8×10^{-1}
Mercury-197	8×10^{-1}	20
Thallium-201	4×10^{-1}	10
Mercury-203	1×10^{-1}	3

Note

In the case of a waste that contains a mixture of radionuclides, the limiting values for purposes of this appendix shall be determined as follows:

For each radionuclide in the mixture, calculate the ratio between the quantity present in the mixture and the limit established in this appendix for the specific radionuclide when not in a mixture. The sum of such ratios for all the radionuclides in the mixture may not exceed 1.

Examples: If the concentrations of radionuclides a, b, and c in the waste are represented by C_a, C_b, and C_c and the applicable concentration limits are CL_a, CL_b, and CL_c, respectively, then the concentrations shall be limited so that the following relationship exists:

$$(C_a/CL_a) + (C_b/CL_b) + (C_c/CL_c) \leq 1$$

If the total curies for radionuclides a, b, and c are represented by A_a, A_b, and A_c and the annual curie limits are AL_a, AL_b, and AL_c, respectfully, then the generator is limited to the following:

$$(A_a/AL_a) + (A_b/AL_b) + (A_c/AL_c) \leq 1$$

Adopted May 14, 1997 Effective June 5, 1997

§336.366. Appendix I. Soil and Vegetation Contamination Limits for Selected Radionuclides.

Soil and Vegetation Contamination Limits
for Selected Radionuclides
(For use in §336.356 of this title (relating to
Soil and Vegetation Contamination Limits))

Radionuclide	Concentration Limit (picocuries/gram)
Americium-241	6
Antimony-125	100
Bismuth-207	60
Cadmium-109	200
Carbon-14	800
Cesium-137	40
Cobalt-60	300
Europium-152	80
Europium-154	20
Europium-155	200
Hydrogen-3	3,000
Iodine-125	200
Iodine-129	200
Iodine-131	60
Iridium-192	40
Iron-55	2,000
Nickel-63	700
Plutonium-238	6
Plutonium-239	6
Plutonium-240	6
Promethium-147	200
Scandium-46	40
Sodium-22	30
Strontium-90	40
Technetium-99	200
Thallium-204	60
Thorium-230	6
Thorium-232	8
Uranium-234	6
Uranium-238	8

§336.367. Appendix J. Cumulative Occupational Exposure History.

CUMULATIVE OCCUPATIONAL EXPOSURE HISTORY

1. NAME (LAST, FIRST, MIDDLE INITIAL)	2. IDENTIFICATION NUMBER	3. ID TYPE	4. SEX MALE ☐ FEMALE ☐	5. DATE OF BIRTH

6. MONITORING PERIOD	7. LICENSEE NAME	8. LICENSE NUMBER	9. RECORD ☐ ESTIMATE ☐ NO RECORD ☐	10. ROUTINE ☐ PSE ☐

11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODE

6. MONITORING PERIOD	7. LICENSEE NAME	8. LICENSE NUMBER	9. RECORD ☐ ESTIMATE ☐ NO RECORD ☐	10. ROUTINE ☐ PSE ☐

11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODE

6. MONITORING PERIOD	7. LICENSEE NAME	8. LICENSE NUMBER	9. RECORD ☐ ESTIMATE ☐ NO RECORD ☐	10. ROUTINE ☐ PSE ☐

11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODE

6. MONITORING PERIOD	7. LICENSEE NAME	8. LICENSE NUMBER	9. RECORD ☐ ESTIMATE ☐ NO RECORD ☐	10. ROUTINE ☐ PSE ☐

11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODE

6. MONITORING PERIOD	7. LICENSEE NAME	8. LICENSE NUMBER	9. RECORD ☐ ESTIMATE ☐ NO RECORD ☐	10. ROUTINE ☐ PSE ☐

11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODE

19. SIGNATURE OF MONITORED INDIVIDUAL	20. DATE SIGNED	21. CERTIFYING ORGANIZATION	22. SIGNATURE OF DESIGNEE	23. DATE SIGNED

INSTRUCTIONS AND ADDITIONAL INFORMATION PERTINENT TO THE COMPLETION OF CUMULATIVE OCCUPATIONAL EXPOSURE HISTORY
(All doses shall be stated in rem)

1. Type or print the full name of the monitored individual in the order of last name (include "Jr," "Sr," "III," etc.), first name, middle initial (if applicable).

2. Enter the individual's identification number, including punctuation. This number should be the 9-digit social security number if at all possible. If the individual has no social security number, enter the number from another official identification such as a passport or work permit.

3. Enter the code for the type of identification used as shown below:

CODE	ID TYPE
SSN	U.S. Social Security Number
PPN	Passport Number
CSI	Canadian Social Insurance Number
WPN	Work Permit Number
IND	INDEX Identification Number
OTH	Other

4. Check the box that denotes the sex of the individual being monitored.

5. Enter the date of birth of the individual being monitored in the format MM/DD/YY.

6. Enter the monitoring period for which this report is filed. The format should be MM/DD/YY - MM/DD/YY.

7. Enter the name of the licensee or facility not licensed by the commission that provided monitoring.

8. Enter the commission license number or numbers.

9. Place an "X" in "Record", "Estimate", or "No Record". Choose "Record" if the dose data listed represent a final determination of the dose received to the best of the licensee's knowledge. Choose "Estimate" only if the listed dose data are preliminary and will be superseded by a final determination resulting in a subsequent report. An example of such a case would be when dose data are based on self-reading dosimeter results, and the licensee intends to assign the record dose on the basis of TLD results that are not yet available.

10. Place an "X" in either "Routine" or "PSE". Choose "Routine" if the data represent the results of monitoring for routine exposures. Choose "PSE" if the listed dose data represent the results of monitoring of planned special exposures received during the monitoring period. If more than one PSE was received in a single year, the licensee should sum all of the PSEs and report the total.

11. Enter the deep-dose equivalent (DDE) to the whole body.

12. Enter the eye dose equivalent (LDE) recorded for the lens of the eye.

13. Enter the shallow-dose equivalent recorded for the skin of the whole body (SDE,WB).

14. Enter the shallow-dose equivalent recorded for the skin of the extremity receiving the maximum dose (SDE,ME).

15. Enter the committed effective dose equivalent (CEDE).

16. Enter the committed dose equivalent (CDE) recorded for the maximally-exposed organ.

17. Enter the total effective dose equivalent (TEDE). The TEDE is the sum of items 11 and 15.

18. Enter the total organ dose equivalent (TODE) for the maximally exposed organ. The TODE is the sum of items 11 and 16.

19. Signature of the monitored individual. The signature of the monitored individual on this form indicates that the information contained on the form is complete and correct to the best of his or her knowledge.

20. Enter the date this form was signed by the monitored individual.

21. (OPTIONAL) Enter the name of the licensee or facility not licensed by the commission providing monitoring for exposure to radiation (such as a DOE facility) or the employer if the individual is not employed by the licensee and the employer chooses to maintain exposure records for its employees.

22. [OPTIONAL] Signature of the person designated to represent the licensee or employer entered in item 21. The licensee or employer who chooses to countersign the form should have on file documentation of all the information on this form being signed.

23. [OPTIONAL] Enter the date this form was signed by the designated representative.

§336.368. Appendix K. Occupational Exposure Record for a Monitoring Period.

OCCUPATIONAL EXPOSURE RECORD FOR A MONITORING PERIOD

1. NAME (LAST, FIRST, MIDDLE INITIAL)	2. IDENTIFICATION NUMBER	3. ID TYPE	4. SEX ☐ MALE ☐ FEMALE	5. DATE OF BIRTH

6. MONITORING PERIOD	7. LICENSEE NAME	8. LICENSE NUMBER(S)	9A. ☐ RECORD ☐ ESTIMATE	9B. ☐ ROUTINE ☐ PSE

INTAKES

10A. RADIONUCLIDE	10B. CLASS	10C. MODE	10D. INTAKE IN μCi

DOSES (in rem)

DEEP-DOSE EQUIVALENT	(DDE)	11.
EYE DOSE EQUIVALENT TO THE LENS OF THE EYE	(LDE)	12.
SHALLOW-DOSE EQUIVALENT, WHOLE BODY	(SDE,WB)	13.
SHALLOW-DOSE EQUIVALENT, MAX EXTREMITY	(SDE,ME)	14.
COMMITTED EFFECTIVE DOSE EQUIVALENT	(CEDE)	15.
COMMITTED DOSE EQUIVALENT, MAXIMALLY-EXPOSED ORGAN	(CDE)	16.
TOTAL EFFECTIVE DOSE EQUIVALENT (BLOCKS 11+15)	(TEDE)	17.
TOTAL ORGAN DOSE EQUIVALENT, MAX ORGAN (BLOCKS 11+16)	(TODE)	18.

19. COMMENTS

20. SIGNATURE -- LICENSEE	21. DATE PREPARED

INSTRUCTIONS AND ADDITIONAL INFORMATION PERTINENT TO THE COMPLETION OF OCCUPATIONAL EXPOSURE RECORD FOR A MONITORING PERIOD

(All doses shall be stated in rem)

1. Type or print the full name of the monitored individual in the order of last name (include "Jr," "Sr," "III," etc.), first name, middle initial (if applicable).

2. Enter the individual's identification number, including punctuation. This number shall be the 9-digit social security number if at all possible. If the individual has no social security number, enter the number from another official identification such as a passport or work permit.

3. Enter the code for the type of identification used as shown below:

CODE	ID TYPE
SSN	U.S. Social Security Number
PPN	Passport Number
CSI	Canadian Social Insurance Number
WPN	Work Permit Number
IND	INDEX Identification Number
OTH	Other

4. Check the box that denotes the sex of the individual being monitored.

5. Enter the date of birth of the individual being monitored in the format MM/DD/YY.

6. Enter the monitoring period for which this report is filed. The format should be MM/DD/YY - MM/DD/YY.

7. Enter the name of the licensee.

8. Enter the commission license number or numbers.

9A. Place an "X" in "Record" or "Estimate". Choose "Record" if the dose data listed represent a final determination of the dose received to the best of the licensee's knowledge. Choose "Estimate" only if the listed dose data are preliminary and will be superseded by a final determination resulting in a subsequent report. An example of such a case would be when dose data are based on self-reading dosimeter results and the licensee intends to assign the record dose on the basis of TLD results that are not yet available.

9B. Place an "X" in either "Routine" or "PSE". Choose "Routine" if the data represent the results of monitoring for routine exposures. Choose "PSE" if the listed dose data represent the results of monitoring of planned special exposures received during the monitoring period. If more than one PSE was received in a single year, the licensee should sum all of the PSEs and report the total.

10A. Enter the symbol for each radionuclide that resulted in an internal exposure recorded for the individual, using the format "Xx-###x," for example, Cs-137 or Tc-99m.

10B. Enter the lung clearance class as listed in §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage) (D, W, Y, V, or O for other) for all intakes by inhalation.

10C. Enter the mode of intake. For inhalation, enter "H." For absorption through the skin, enter "B." For oral ingestion, enter "G." For injection, enter "J."

10D. Enter the intake of each radionuclide in μCi.

11. Enter the deep-dose equivalent (DDE) to the whole body.

12. Enter the eye dose equivalent (LDE) recorded for the lens of the eye.

13. Enter the shallow-dose equivalent recorded for the skin of the whole body (SDE,WB).

14. Enter the shallow-dose equivalent recorded for the skin of the extremity receiving the maximum dose (SDE,ME).

15. Enter the committed effective dose equivalent (CEDE) or "NR" for "Not Required" or "NC" for "Not Calculated".

16. Enter the committed dose equivalent (CDE) recorded for the maximally-exposed organ or "NR" for "Not Required" or "NC" for "Not Calculated".

17. Enter the total effective dose equivalent (TEDE). The TEDE is the sum of items 11 and 15.

18. Enter the total organ dose equivalent (TODE) for the maximally-exposed organ. The TODE is the sum of items 11 and 16.

19. Comments. In the space provided, enter additional information that may be needed to determine compliance with limits. An example is to enter the note that the SDE,ME was the result of exposure from a discrete hot particle. Another example is to indicate that an overexposure report has been sent to the commission in reference to the exposure report.

20. Signature of the person designated to represent the licensee.

21. Enter the date this form was prepared.